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A COMPLEAT BODY OF HUSBANDRY.

CONTAINING

Rules for performing, in the moſt profitable Manner, the whole Buſineſs of the Farmer and Country Gentleman,

IN

Cultivating, *Planting* and *Stocking* of Land;

In judging of the ſeveral Kinds of *Seeds*, and of *Manures*; and in the Management of *Arable* and *Paſture Grounds*:

TOGETHER WITH

The moſt approved Methods of Practice in the ſeveral Branches of HUSBANDRY,

From ſowing the SEED, to getting in the CROP; and in Breeding and Preſerving CATTLE, and Curing their DISEASES.

To which is annexed,

The whole Management of the ORCHARD, the BREWHOUSE, and the DAIRY.

Compiled from the Original Papers of the late

THOMAS HALE, Eſq;

And enlarged by many new and uſeful Communications on Practical Subjects,

From the Collections of Col. STEVENSON, Mr. RANDOLPH, Mr. HAWKINS, Mr. STOREY, Mr. OSBORNE, the Reverend Mr. TURNER, and others.

A WORK founded on Experience; and calculated for general Benefit; conſiſting chiefly of Improvements made by modern Practitioners in Farming; and containing many valuable and uſeful Diſcoveries, never before publiſhed.

ILLUSTRATED WITH

A great Number of CUTS, containing Figures of the Inſtruments of Huſbandry; of uſeful and poiſonous Plants, and various other Subjects engraved from Original Drawings.

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A
Compleat Body
of
HUSBANDRY.

VOLUME THE FOURTH.

CHAP. I.

Of Engliſh vineyards.

THE preceding work having been written, as it was undertaken, for the ſervice equally of the farmer and country gentleman, we ſhall purſue the ſame plan in the additional part: and ſhall ſet out with the conſideration of vineyards in England.

The great miſtakes which have been made in the choice of ground, and in the management of theſe peculiar plantations, have in a manner diſheartened the kingdom from farther attempts: but there is no reaſon it ſhould be ſo. That may ſucceed very well in a ſkillful hand, which has failed under the ignorant; and as we ſhall lay down the true practice in a plain manner, and relate thoſe miſtakes which have occaſioned the frequent ill ſucceſs, it will be eaſy to obſerve the one, and avoid the other.

This we can ſay with certainty, that very good wine may be made in England: and that in many parts of the kingdom there are pieces of land which might be turned to ſome account this way, at a ſmall expence; and others which will anſwer to a more chargeable preparation, in ſuch a manner as to make the farmer very happy.

We ſhall not ſuppoſe any one will undertake this buſineſs, unleſs he have a piece of ground fit for it; and with this conſideration, we may rank the deſigns and purpoſes of thoſe who undertake it, under two heads: the country gentleman will probably raiſe his vines for wine for his own drinking; but the farmer is not to ſee the plantation in that light. There goes a great deal more trouble to the making the wine, than to the management of the ground; and in this country he may find a purchaſer for his product, at any time, or in any condition. I have drank with the diſtinguiſhed and eminent doctor Shaw, wines made under his own care, from a little vineyard behind his garden at Kenſington, which equalled many of the lighter wines of France, and while due care was taken of the vineyard at Hammerſmith, a great deal very good was obtained there for ſale: yet neither of theſe were naturally favourable ſpots.

The *Bath* vineyards might ſerve as a better example to the huſbandman; who ſhould conſider only profit for them, the juice of the grapes was ſold there as it was preſſed from the fruit, and the owners had no farther care than managing the ground, and gathering.

In one of theſe inſtances there was excellent wine made for the table, in the other a profitable kind for ſale, and in the third, no more trouble was allowed to this than the farmer uſually affords his ſlighteſt products, yet they all anſwered while duly conducted. The two latter might eaſily have been better managed, and their profits rendered threefold. We ſpeak of what we know with certainty, having ſeen and examined them all: and upon this plan we ſhall direct the culture under two diſtinct heads, as it will regard the gentleman who raiſes his vines for the ſervice of his table, and as it may concern the huſbandman, who conſiders the vineyard as part of his crop.

The greateſt advantages in both caſes will reſult from introducing the horſehoeing huſbandry into this practice, for no growth receives ſo much benefit from that as the vine; and we can aſſure the Engliſh huſbandman, that it is the tillage given to the vineyards abroad; and that their ſucceſs is more owing to this, than any other article whatſoever.

CHAP. II.

Of the proper ground for a vineyard.

A Great inducement to the planting vines in this country, is, that ſome of our very worſt lands will ſerve the purpoſe.

The vine thrives beſt in poor ſoils, but they muſt be of a proper condition, and whether pleaſure or profit be the intent of the plantation, either will depend in a great degree on that firſt choice.

In England gardeners always throw rubbiſh into the ground, where vines are to grow, to impoveriſh it; and in France, though their land is naturally much poorer, they are often obliged to uſe the ſame expedient. It is eaſy to know the expence there will be in bringing on rubbiſh to a large ground; and it will be very idle to uſe ſuch a piece for this purpoſe, as wants impoveriſhing: becauſe its natural richneſs will ſuit it to crops which requires a better nouriſhment. Therefore let the choice fall upon a piece of ground which is poor in itſelf, and the poverty of which is of a right kind; reaſon ſays what this ſhould be, and experience confirms it. If the gardener throw in brickbats, becauſe his mould is too rich for the vine, let the huſbandman look for a piece of ground which naturally abounds with materials reſembling theſe.

I have obſerved, that in ſome parts of England where there are ſtone quarries, the gardeners uſe the chippings of ſtone inſtead of brickbats, and I have found the grapes always thrive the better. This may be an excellent leſſon to the field planter. He ſees ſome mould and ſome rubbiſh of this kind affords the proper ſoil for the vine; and if he can find a piece where there is a quantity of this kind of rubbiſh naturally in the ground, none can anſwer his purpoſe ſo well.

Of the ſeveral kinds of ſtone, the free-ſtone and ſand-ſtone are the beſt, for they are warmeſt. We have in many parts of England ground which is rendered of little value, by a mixture of ſuch ſtone in ſmall fragments. I have obſerved this particularly in Northamptonſhire and Leiceſterſhire; and theſe and the like pieces would be excellent for the purpoſe of vineyards.

Let the huſbandman be careful he make no miſtake in the nature of the ſtone, for that might prevent all ſucceſs. In Derbyſhire the ſtone toward the ſurface is often a kind of marble, like that we ſee ſometimes wrought into tables and chimney-pieces. A mixture of this in the ground would be highly improper, for marble is of a cold nature. The chips of free-ſtone warm a land, for they imbibe and retain the beams of the ſun; but it is the contrary in the marble kinds: they always render it cold. Brickbats being of the nature of ſtone, ſpungy and porous, are alſo warm; but I know from experience, that chipings of ſtone are better. For the ſervice of the gardener theſe may be bought at the maſons, he taking care that no chips of marble are mixed with them; but for the field plantation, they ſhould be naturally in the ground.

In earlier time, this peculiar good quality of ſtony land for vines was known, and the vineyards planted on ſuch ground were of the greateſt ſervice; they produced a good, ſound, and ſtrong wine, and that in ſuch quantity as to be the common drink of the better ſort of the inhabitants.

Thoſe who had raiſed vineyards, and made wine from them in ſuch places, were imitated, or thought to be imitated by others in leſs favourable ſoils; and theſe produced ſo ill, that they brought the whole practice into diſrepute. The monks raiſed vines in the cloſes near their monaſteries, where the chipings of the ſtone uſed in thoſe vaſt buildings had been thrown, and they always ſucceeded: ſo far as we read, there never was one of theſe plantations that failed. The ſame ſucceſs attended thoſe who planted on ground naturally ſtony: but it was accident which gave the due quality to the ſoil in the firſt places, and chance conducted the planter into the ſecond. Forty vineyards were planted in improper, for one on theſe favourable pieces of ground; and the ill ſucceſs of the generality, brought the whole into diſgrace. Gardening was little underſtood in our country at that time; and it is not a wonder, that with an unfavouring ſoil, and poor management, the plantations yielded little.

Thus were vineyards in a manner baniſhed out of England; and it is but of late we have undertaken the raiſing them again. Many who have made this attempt have been ignorant of the true principles, and therefore have failed: but the huſbandman will thus ſee that it has been practiſed to advantage, and will learn how it may be ſo practiſed again.

The reader ſees thus the general requiſites, and beſt advantages for the vine; but theſe are not the only ſoils which will ſuit it. The ſituation ſhould be warm and open to the ſun; and an advantage in this reſpect will often make amends for ſome degree of defect in the other.

The great principle is this. The vine requires ſun and warmth, and whenever it is planted out of the reach of theſe, or only ſo that its roots can go out of their reach of them, it will not ſucceed.

We have obſerved, the beſt ſoil is a light mould mixed with ſtony particles, but this is not the only one that is proper; a poor loam, where there is not too much depth of ſoil, and where the bottom is dry, will anſwer the purpoſe; and if occaſionally ſome rubbiſh of buildings, or of maſons yards be brought in, they will greatly improve it.

CHAP. III.

Of the bottom for a vineyard ſoil.

THERE is but one ſtratum or bottom, which is abſolutely improper for a vineyard, but that is too common in England: it is clay. To this, and to the natural depth of the ſoil in many places, we owe the ill ſucceſs of former vineyards. Theſe therefore are the two conditions of the ground to be moſt carefully avoided. The vine requires that its roots ſhould lie dry and warm; and that none of them ſhould run ſo deep, as to be out of the reach of the ſun's influence. It is for this reaſon, that in the deep mellow ſoils of England, vines will not ſucceed; nor when there is a clay at the bottom. In the firſt of theſe caſes they penetrate ſo deep, as to be out of the reach of the ſun's warmth, and for that reaſon the juice never properly ripens. In the other they are chilled by the cold wet that always lies upon clay; and therefore either never ripen, or never have a tolerable flavour. Theſe are the two conditions of the ground therefore which the farmer muſt avoid, who would plant a vineyard for profit, or the gentleman for his table. On the contrary, the beſt bottoms are a firm dry gravel, or looſe ſtone at due depth, and chalk.

The two firſt ſtand recommended by moſt who have written on the ſubject; but the third is in many circumſtances equal to either. The depth of ſoil ſhould be greateſt over ſtone, much leſs will do upon a chalk, and a very little on a gravel; it ſhould not be leſs than fifteen inches over a bed of ſtone, leſs than a foot will do upon the others. Many have feared the ſtony bottom, but they ſhould be informed, that ſome of the moſt flouriſhing vineyards abroad are upon that bottom, and the very beſt in England have been ſo ſituated.

CHAP. IV.

Of the ſituation and expoſure.

LET the planter of a vineyard in England be upon his guard againſt all inconveniencies, or he will injure himſelf, and continue to diſcredit the practice; though the contrary of both is as certain, to follow a due choice of ground, and an obſervance of right rules. A vineyard muſt not be expoſed to the north winds, nor muſt it ever be planted on a flat piece of ground. The fruit will be blaſted in the former of theſe caſes, and chilled till it is good for nothing in the other. Wet always lodges in flats, let the bottom be what it will, and this will certainly deſtroy the hopes of a vineyard. Some, to avoid this miſchief, have taken the ſteep ſlope of a hill, but that is as bad: it is the miſtake of ill judging perſons, always in avoiding one error, to run into another. The beſt rule will be to enquire on what ground the vineyards of France and Italy ſucceed beſt; and this will be found to be a very gentle declivity, a fall of four foot in fourſcore yards, or thereabouts, is as near the matter as can be given in general terms. This, with a proper expoſure, will lay the roots open to the ſun in their ſlight bed of mould; and what wet falls more than the neceſſary quantity for the nouriſhment of the vines, will drain off.

With regard to the expoſure, there is but one kind proper for a vineyard, and this is the ſouth eaſt. If the planter have a piece of ground in this ſituation, and with theſe advantages, let him examine the adjacent country with reſpect to its wood and water, and if it be favourable in theſe two reſpects, he may promiſe himſelf the greateſt ſucceſs.

It will be ſeen by theſe and the ſucceeding directions, that there are a great many particulars neceſſary to concur for the making a vineyard proſperous in England; and with all we have ſaid of the practicability of the ſcheme, we do not pretend it will do without them. This will ſhew there is no wonder that the vineyards attempted in England have generally failed, for we ſhall ſee that while they were planted at random, there is not one ſpot in a thouſand that can anſwer.

CHAP. V.

Of the condition of the adjacent country.

WE owe to that great light of modern philoſophy, Dr. Stephen Hales, the proof of what was long ſuppoſed before it was certainly known, namely, that plants imbibe a great part of their nouriſhment from the air. This is a very eſſential article to the vine; for its fruit is greatly affected by the ſtate of the air. We have ſeen that warmth and dryneſs are the great requiſites in the ſoil, for the perfecting the juices of this fruit; and we may be aſſured from the laſt obſervation, that the ſame qualities are required in the air.

It is certain, that in the vine countries the temperature of the air is of this kind, much drier and much warmer than in England; and we may alſo find by experiments, that the air in ſome parts of our own country is much warmer, and drier than in others.

Two things fill the air with damp cold vapours, theſe are ſtanding waters, and large plantations of trees. Therefore if a piece of ground be ever ſo proper in itſelf for ſuch a plantation, it muſt not be uſed for it, if there be theſe objections in the adjoining countries.

No man would plant a vineyard in the fens, becauſe the roots of the vine which ought to ſpread juſt under the ſurface, and within the influence of the ſun, would there run to an immoderate depth; nor ſhould he any more plant it in the neighbourhood of ſuch places, for the air being rendered damp by the exhalations from the wet ground, the bogs and ditches would make the juices watery.

Some have thought neighbouring woods an advantage, becauſe they broke and kept off winds; but the miſchief they do by the great quantity of watery vapours continually exhaled from them, is more than equal to the advantage of the ſhelter.

It is neceſſary a vineyard ſhould be ſheltered, but it ſhould be by diſtant hills, not by near foreſts. The great care is defence from the north and weſt points; but this muſt not be ſought at the expence of a miſchief, at leaſt, as great as would ariſe from the expoſure.

The planter now ſees exactly what he is to fix upon as the ſpot for a vineyard: the very gentle deſcent of a riſing ground open to the ſouth eaſt, ſheltered by hills at a due diſtance to the north and weſt, with a warm, light, and not rich ſoil, and with a dry bottom, where there are no large plantations of trees near, and where there is no great quantity of wet ground or ſtanding water.

The hills which defend the ground muſt not be ſo near as to cloſe it up, for then the winds would not have ſcope to blow freely through the plantation, which is an eſſential article; and though large ſtagnating waters are moſt hurtful, if there be a ſwift brook near the bottom of the ground, it will be an advantage. This compleats the articles of ſoil, ſituation and expoſure. He who has not a piece of ground with theſe advantages, ſhould not think of a vineyard; he who has, may promiſe himſelf ſucceſs in the plantation.

This is all which concerns the gentleman planter; but to the huſbandman, one conſideration is neceſſary more, which is, the place being ſo ſituated, that he can ſell the juice.

The grapes raiſed as we ſhall direct, on ſuch a ſpot as this, will afford an excellent and rich juice, capable of making a valuable wine, and we ſhall add how that is to be done; but the farmer ſhould have no farther trouble than raiſing the crop, and preſſing the juice. There are people in England who always know what to do with it. The juice of the grapes from the vineyard near Bath, was ſold as it came from the preſs; and near ſuch a town as Briſtol or London, there will always be a demand for it. The wine coopers, and certain others, always know what to do with it. Without this advantage it is not worth while to raiſe vines as an article of profitable huſbandry, for the farmer can employ his time better, than in conducting the making it into wine.

This will determine alſo the quantity of ground to be planted when a proper ſpot is found; for unleſs there be this advantage of a ready ſale for the freſh juice, a little ground will raiſe vines enough for all other occaſions. When there is that demand, a large quantity of proper ſoil may be very wiſely employed for this purpoſe; for the expence of the common implements, ſo far as relates only to preſſing the juice, is not great; and the ground will no way yield more advantage.

CHAP. VI.

The preparation of the ground.

AS the vine delights in an open ſoil, the perfection of the grapes will depend upon its being kept in perfect tillage. In order to this, it muſt firſt be brought into a good tilth, and a due portion of time muſt not be refuſed to this; nor ſufficient and repeated labour.

The four coultered plough is the inſtrument, and if there be any addition neceſſary to the ſoils, this is the time to make it. If ground ſoil be ever ſo proper in its nature, but want ſome ſtony parts, if theſe can be had, it will be very proper to add them. They ſhould be in pieces of about an inch broad, and flat. They come larger from the maſons, but they ſhould be brought to this ſize nearly by breaking with a mallet; and when this is done, they are fit to be worked in.

In autumn let the four coultered plow be brought into the ground. This inſtrument will cut to a greater depth than is needful here, therefore it muſt be ſet properly according to the quantity of ſoil. We will ſuppoſe this a foot deep, which is about a medium in what is proper for vineyards. Let it all be turned up and torn to pieces thoroughly with this plow; and then carefully wrought over with a harrow. This will draw out the roots of many of the weeds which the plow had cut up.

After it has lain ten days from this operation, let the ſtone chippings be ſcattered over it: and then let it be harrowed again.

The quantity of chips muſt be according to the nature of the ground, the mellower it is the more it will want of them. Theſe, or ſomething of the ſame nature, ſhould always be mixed in ſuch quantity with the ſoil of a vineyard, that the roots, as they run among the mould, may frequently creep over and between them. Theſe ſpungy, yet hard ſubſtances, receive a great deal of the ſun's rays, and they keep a warmth in the roots, which is the greateſt of all articles, in giving a richneſs to the juice.

After this, once in ſix weeks, let the ground be well plowed up, that is, four times during the courſe of the winter; and every time let the ſame care be taken of picking out roots of weeds.

In this manner it will have received the benefit of a moſt perfect fallow for ſix or ſeven months. The air will have mellowed it, and the tillage will have broke it ſo fine, that it will be in a perfect good condition for planting.

The ſeaſon for this is ſpring, and it is to be done in the following manner.

CHAP. VII.

Of planting the ground.

IN the middle of March every thing muſt be ready for planting the vineyard. We have ſhewn in the account of the horſehoeing huſbandry, the vaſt advantage of planting in rows with due diſtance; and in ſo large a growth as the vine, it is moſt of all neceſſary. The ground we recommend for this ſervice is cheap, therefore it would be idle to plant the rows too cloſe; a ſmall addition to the quantity will give them the needful ſpace, and then the plow will come in better between, and all the labour of the vineyard will be more conveniently performed, beſide that the roots of the vines will have more room to ſpread, and the air a more free courſe between the plants.

We have ſhewn in the management of an orchard, that the flavour of the fruit in a great meaſure depends upon the free courſe of the air, not only among the ſeveral boughs of the ſame tree, but between tree and tree: and this is moſt of all eſſential to the vine, becauſe its fruit ripens later, and obtains the true flavour more difficultly than any other kind whatever.

For theſe reaſons let the ſpace be wide between row and row: we have laid the reaſons in this fair view before the reader, that he may not be ſurprized at our directing a much larger diſtance than is commonly given. If vapours be pent up among the vines, or if the rows ſhade one another, the grapes will never ripen. If the roots run too deep, we ſee the fruit ſuffers. And though we have ordered a kind of ground, in which they cannot eaſily do this, yet it will be proper to encourage the contrary by all poſſible means. And the more compaſs they have upon the ſurface, the leſs they will be tempted to force a paſſage downwards.

It is eſſential alſo, that the ſun beams have full power upon the ſurface at a ſlight depth, under which theſe roots run; this will be in ſome degree provided by the courſe in which the rows will be directed to be planted; but the greateſt means of obtaining this advantage is by allowing the full diſtance of which we ſpeak between row and row. Having explained the cauſe of what is particular in our directions on this head, we ſhall proceed to give them. We have explained them thus largely, that all may ſee the reaſon of the practice.

Therefore, when the ground is fine and this perfect order, let the rows be marked out at fifteen feet aſunder, and let them be drawn in ſtrait lines running exactly the ſame courſe with the expoſure of the ground, that is, ſouth eaſt. This will give the ſhrubs air and ſun; and particularly it will lay their roots, as they run acroſs theſe intervals, open to the full power of the heat upon the ſhelving ſurface.

The next thing is to mark the diſtances of the vines in theſe rows, and this ſhould be two yards and a half.

The great article now comes to be conſidered of the kind to be planted. We have a vaſt variety of grapes in England, and the planter is happy if he will be guided well which to chuſe.

In fruits in general there are ſugary and ſharp kinds, it is ſo in pears and apples; and the beſt for cyder and perry, are thoſe which have leaſt of that ſweet mellowneſs which recommends them for the table. This our reverend correſpondent has ſhewn, who favoured us with the treatiſe on cyder-making; and if we will truſt their experience, who have given proofs that they know, we ſhall prefer in the ſame manner the harſheſt and rougheſt grapes for the vineyard.

They have in France, Spain, and Italy, rough and ſweet grapes, as well as we in England: but the beſt wines are made there from the rougheſt fruit.

Thoſe are idle who would limit the choice to any one kind, for we have ſeveral vines in England which equally produce theſe auſtere grapes; any of thoſe may be choſen, but the great care muſt be to mix none of the ſweet kinds among them; in cyder a mixture of various kinds of apples gives an advantage to the liquor, but in wine it is otherwiſe; the ſeveral kinds of rough grapes, which differ as varieties, not as diſtinct ſpecies, may be mixed, without damage to the wine; but if any one ſhould plant in the ſame vineyard rough and ſweet grapes, he would make a very great miſtake: for experience ſhews, that the juices of theſe two kinds never mix well, or ferment properly together; though the juices of two or more of the auſtere kinds, or of two or more of the ſweet grapes, will ferment as regularly, and make as good and entire a wine, as if the whole quantity of fruit had been gathered from the ſame ſhrub, in ſpecies and in name.

As to the article of planting, layers are altogether beſt for vines which are to ſtand againſt walls, but cuttings for thoſe which are to be in the open ground. Therefore there is no queſtion about this matter.

The laſt week in March let the holes be opened at the diſtance already directed. They ſhould be fifteen inches broad, and their depth the full thickneſs of the ſoil, which, if the ground have been properly choſen, will be about as much, or ſomething leſs. Theſe being all opened, and the mould laid upon one ſide, let the cuttings be brought in.

They ſhould be taken from vines of a good growth and cut off with a knot of the former year's wood with them; then they ſhould be taken off at the upper part till they are about twenty inches long; and thus laid ready for the ſervice. They ſhould be placed with the thick part or knot of the old wood about three inches under the ſurface, and the reſt above; but this is to be covered by a ſcattering of ſtraw, or other light matter, to prevent its drying by the air.

When the holes are opened, the cuttings ſhould be taken up and ſet to ſoak at the bottoms for eight hours in water. The beſt method is to take out of the ground as many as can be conveniently ſet in one evening; and to put them to ſoak about ten in the morning; then they will be ready for planting at ſix.

A little of the mould muſt be thrown into the bottom of the hole, and drawn up ſloping toward one ſide. Then the cutting is to be laid ſlanting in, and the mould carefully poured in about it and ſettled to it. Then it muſt be raiſed a little in a hill in the places, for the length of the cutting will not permit its being wholly covered in this manner, and it is neceſſary that it muſt be under ſome mould above the uppermoſt bud, otherwiſe it will not ſucceed.

It is from this bud the future vine is to grow, and if the dry air parches it up before the cuttings begins to attract nouriſhment, it will periſh.

The mould muſt be laid down about the cutting, and preſſed cloſe in the little hill which is raiſed for defence of the bud; and this is all that is required for the preſent. The ground has been juſt plowed, and there will for the preſent be no weeds. April is a ſhowery ſeaſon, ſo that no watering will be neceſſary, and thus all is to be left to nature.

When the cuttings begin to ſhoot, a ſlight ſtick of a yard long is to be thruſt into the ground near each, to which the principal ſprout muſt be tied up with ſome ſoft baſs; and this muſt be repeated at times, to keep it out of the power of hurt from the winds.

At the latter end of April weeds will appear upon the ground, and this is the notice of beginning the horſehoeing huſbandry. Let the hoe plow or horſehoe be brought in, and the ground lightly turned up. It will deſtroy the young growth of weeds, and expoſe the mould to the air, with a new ſurface, this will be properly ſpeaking its laſt fallowing: for the roots from the cuttings will not yet have ſhot far enough to have the advantage which will afterwards ariſe from this practice in breaking off their extremities, and throwing new mould about them.

A month after this, let the planter walk over the ground, and examine all his young vines; wherever there grows a uſeleſs ſide ſhoot, let it be taken off, that all the nouriſhment be carried where it is wanted; and once in ſix weeks let the ground be turned up between the rows with a hoe plow; and the weeds cleared between the vines in the rows with a hand hoe.

All this time the vines draw but little nouriſhment, but the earth being broken and freſh turned to the air by this repeated tillage, it is improving in its nouriſhing qualities; and there being no weeds ſuffered to grow to exhauſt its ſtrength, it will be in the moſt perfect condition, when the plantation moſt requires it.

CHAP. VIII.

Of pruning the vines the firſt ſeaſon.

GARDENERS like ſurgeons, think they have moſt credit when they uſe the knife moſt boldly; but all extreams are wrong. The condition of theſe vines in autumn will be, that they have a ſhoot much longer than they can ſupport through winter. The ignorant and careleſs who leave them as they are, expoſe them to the froſts, which nip the tops of the ſhoot, and then continue the deſtruction downwards, ſo as often to deſtroy, and always to weaken the plants.

On the contrary, thoſe who have been tutored in the falſe ſchool of gardening, cut them down to the ground, or very nearly ſo. Theſe extreams are equally wrong: at the beginning of autumn let the planter mark the condition of his vines; and the laſt week in September let him prune them according to their ſtrength, leaving two or three joints: and with a ſharp knife and ſteady hand, cutting off the reſt of the ſhoot.

Then let the ground have its laſt dreſſing for the ſeaſon, in the ſpaces between the rows, and let the hand hoers, who cut up the weeds in the rows, where the other inſtruments cannot come, draw up a hill of fine mould five inches above the ſurface round the ſtem of every plant.

The ground may now lie ſix months at reſt. But in the March following it muſt be again turned very well with the hoe plow, and the hills muſt be made up to every plant within half an inch of the lowermoſt of the buds left on.

The rains of ſpring follow, the ground is mellow and clear, it is ſuited to the nature of the growth, and the vines are in a condition to puſh with vigour.

CHAP. IX.

The management of the vines the ſecond year.

ONE uſeful ſhoot is to be expected from each bud or eye left the laſt autumn; and no more are to be ſuffered. At the laſt dreſſing ſticks of four feet long muſt be thruſt into the ground, two or three to each bud: for one ſhoot only muſt be tied to each.

When the ſeaſon begins to be warm, they will puſh, and this is the direction for once more plowing up the ground between them. The planter muſt not be alarmed at this frequent ploughing; or think from that the plantation requires an expenſive management. The trouble is really very trifling, and the charge leſs than is employed on any other growth. The ſoil being light and in good order, theſe ploughings are very eaſy, and come very cheap; and the attendance that is required beſide, during the growth of the ſhoots, is very little.

It will be neceſſary to go over the ground now and then to ſee the vines do not exhauſt themſelves in uſeleſs growth of ſide ſhoots. And wherever theſe appear, they muſt be rubbed off in the bud. The ground muſt be ploughed over once more during the ſummer; and at autumn the pruning muſt be repeated.

In this the ſtrength of the vine muſt be regarded: and therefore no abſolute direction can be given how much wood to leave. The ſtrongeſt ſhoots ſhould have three eyes left on each at this pruning, and this is the beſt ſtate at which it is poſſible they can arrive. Two ſhoots from a cutting of the laſt year, which have ſtrength enough to bear three eyes apiece, is the utmoſt growth and ſtrength that can be expected: and this the culture here laid down, will generally produce and ſupport. In the uſual way of managing a new ploughed vineyard, half the cuttings ſhoot but from one of their eyes the ſecond year, and many of them but very weakly even there, ſo as to require being cut down to two eyes in this pruning. In the horſehoeing method there pretty conſtantly will be two ſtrong ſhoots from each cutting, which may be left with three eyes each.

CHAP. X.

The management of the vineyard the third year.

THE time of growth of the vines is ſo many years loſs to the planter; but the rent of ſuch ground, as we have directed to be uſed for them, is ſmall: and the charge of attendance is alſo little. They will now be coming toward a ſtate wherein they will amply repay the charge.

All the winter this year the land is to lie at reſt, as during the laſt; and in ſpring it is to be well turned up again. Two ſtrong ſtakes are to be driven into the ground at a ſmall diſtance from each vine, and the two ſhoots are to be tied to theſe in a poſition ſlanting moderately upwards from the place where they riſe.

The mould muſt be again drawn up in hills about the ſtem of each vine; and the ground muſt be twice more during this ſummer, turned and well broke by horſehoeing.

Now will be ſeen the great advantage of that practice. The ends of the roots will be broken off in theſe hoeings, and falling in a freſh turned, looſe, and unexhauſted ſoil, there will ſhoot out from every broken extremity a number of more roots and fibres: theſe ſpreading horizontally among the freſh mould will run at liberty, and the influence of the ſun will be ſtrongly upon them.

The vines will ſhoot vigorouſly from all the eyes on the ſtems, and the care muſt be to rub off weak and ill placed ſhoots, and to favour and ſupport the ſtrong and hearty ones, by tying them up to the ſtakes.

Thus will the growth proceed well, and no ſtragling branches being allowed to exhauſt the roots, all the rich nouriſhment received by them, will be employed in forming good wood. This will then ſhew itſelf from time to time, and not being ſtarved or ſhaded, it will harden as the bearing ſhoots do in more favourable countries.

Indeed, by what I have ſeen, the difference of climate may very well be equalled by good management of the growth; and vines in England will thus ſhew themſelves in the ſame ſtate wherein they appear in more ſouthern countries.

The ſummers in the wine countries are drier than in this iſland, and the air is leſs loaded with fogs. Therefore the young ſhoots of the vines are harder, becauſe they are ſurrounded by a drier air. This is the real reaſon; and this ſhews how we ſhould regulate our plantations for obtaining the ſame advantage. As damp is the article to be feared, we ſhould give the ſun and air free paſſage between, about, and among the vines: this is contrived by our diſtant manner of plantations, and it will be promoted greatly by obſerving to diſplace the uſeleſs ſhoots, which will, during this third ſummer, riſe from the ſtems among the good ones. The abundant nouriſhment given by our method of culture, promoting the free growth of the plants, encourage this; and it is the purpoſe of the work to give that nouriſhment, not to ſuch uſeleſs parts, but to the eſſential. This is done by rubbing off all falſe ſhoots as ſoon as they appear; and the good conſequence follows alſo, of preventing the proper ſhoots from being ſhaded, which would make them weak.

This is the care required during the growing months, and with this the vineyard will make the greateſt poſſible advances.

In the courſe of this ſummer, each of the branches left at the laſt autumn pruning, will have formed three good ſhoots. Theſe are to be left on for fruiting, only taking them at the proper time in the ſucceeding autumn. The next ſeaſon, being the fourth, is the proper time for their bearing for advantage.

The new wood having been open to the air, and well nouriſhed during ſummer, will be firm and hard at autumn, and the pruning is then to be done in this manner.

The uppermoſt new ſhoot muſt be pruned, ſo as to leave it three eyes; and the others, to leave them two each; in this ſtate the vines will be of a very firm ſtrength for their age, and they will be in a condition to bear largely the ſucceeding year. When the vines are thus pruned, the ground ſhould be lightly turned once more by a ſingle furrow in the middle of each interval. This deſtroys the autumnal weeds, and they will rot and make a kind of manure. No more will grow during the ſucceeding winter, and the ground will have the advantage of a fallow for that time. This will put it in perfect good condition for the following years important growth.

The quantity of wood we have ordered to be left on, will produce no mean allowance of grapes: more might be obtained that year by leaving on an eye more on each ſhoot, but this would exhauſt the roots.

Patience in regard to the produce is the great article in the management of a vineyard; and he who ſhould puſh the roots to their full bearing this year, would hurt them for many to come.

After this they will be too well eſtabliſhed for damage. The common error in gardening is letting fruit trees bear too much while they are young. It is the fruit in all plants that moſt exhauſts the root; and at this period it is very ill huſbandry to ſuffer it. He who permits his wall trees to be overloaded one year, ſees them empty the next for that very reaſon; and this is the true account of what is ſaid concerning trees bearing every other year. The full ſeaſon exhauſts the roots, ſo that they can do nothing the enſuing; but producing little that year, they are recruiting for the ſucceeding. This is the courſe of nature, who, when ſhe is forced by made ground, requires art to thin her products. In theſe caſes the fruit is never perfect when it is loaded on the tree; and beſide the damage by exhauſting it againſt the ſucceeding year, what is thus erroneouſly kept on, ſpoils the taſte for the preſent. In our grapes of the vineyard it is exactly the ſame, he who will be content with a moderate produce the fourth year, will have that fine in its kind, and will lay the foundation of very rich ſeaſons to come; whereas, if the planter, according to the common practice, puſhes for a large quantity this fourth ſeaſon, which is properly the firſt of regular bearing, he will have the fruit bad that year, and weaken his vines for three or four following ſeaſons.

CHAP. XI.

The management of a vineyard for the fourth year.

EARLY this ſpring good ſtakes muſt be provided, and they muſt be driven firmly into the ground in ſuch number as the ſhoots require, and at the utmoſt diſtance they will bear. To theſe the ſhoots are all to be faſtened in the ſame manner as at firſt, in a moderate and natural poſition, about the middle degree between upright and flat.

This muſt be done with care, and when it is finiſhed, the hoe plow muſt be brought very carefully into the ground. This hoeing is more eſſential than any of the former. The trampling the ground in tying up the vines, has rendered it neceſſary in ſome degree, and the uſe of new broken mould about the roots of plants, is well known.

All weeds being thus cleared away, and every thing in order, the firſt ſettled warmth will fill the eyes of the vines, and they will ſhoot ſtrong. The planter muſt now look carefully over them from time to time, and all offers to ſhoot in wrong places muſt be rubbed off as ſoon as they appear. The tying muſt be continued as the proper ſhoots encreaſe in growth, and in this caution muſt be uſed to keep them at a due diſtance above one another, and to give the air free paſſage every way among them.

The ſhoots which ſhew fruit muſt be ſuffered to grow only to three joints, beyond the place where the fruit is placed. Thus much is neceſſary, and it will only ſerve the fruit by drawing ſufficient juices to the parts; more would exhauſt the nouriſhment to no purpoſe. The fruit will thus be ſhaded by thoſe leaves which properly belong to it and no more, and it will conſtantly have the ſame degree of ſhade, which is a thing of great conſequence; for when the uſeleſs ſhoots are ſuffered to ſhelter it a conſiderable time, and then removed at once, the change of condition is too great. The fruit receives a check in its growth, and we know, from a thouſand inſtances, that when this is the caſe, it never will have the true flavour. The pine apple is a moſt ſtriking example of this truth. Its culture is ſo delicate, that very frequently it receives checks in the growth. When this happens after the fruit is ſet, it never has a fine flavour, though it ripen to appearance very favourably afterwards.

It is the ſame with the fruit of the vine, and we give this inſtance that the planter may be aſſured of the truth. The way to keep the grapes in a regular ſtate of growth, is to rub off all uſeleſs ſhoots in time, before they have attained any ſize or ſtrength, and by repeated horſehoeings to keep the ground in a good condition for giving nouriſhment. Thus the growth will continue regularly from the firſt ſetting to full maturity.

The planter now ſees what are the ſeveral requiſites to this; and he muſt not expect ſucceſs, unleſs he take this proper method to obtain it. The pruning muſt not leave too much bearing wood, that the fruit be not too much in quantity for the ſtrength of the vines; the ground muſt be kept in tillage while it is ripening, and it muſt have the ſame degree of ſun and ſhade throughout that period. Thus will it have all the requiſites; and England may ripen grapes as well as Burgundy.

This may be done in the common method of keeping vineyards, but our propoſal by the horſehoe offers ſomething more. We know the giving nouriſhment to fruit while ripening, is the great article in its perfection, and it may be done by this, though it cannot by any other kind of tillage, nor is the repetition of the plowing, upon that occaſion, to be accounted a hardſhip.

In the common management of vineyards, the hoeing takes off the weeds for the firſt three years, and the ſpring of the fourth, or firſt fruit year, requires that the ground be dug with the ſpade. Every one knows this is the moſt expenſive of all kinds of culture, and in a large ground it muſt fall very heavy on the planter; nor can it with any reaſonable proſpect of the crop paying, be done more than once.

Our method of horſehoeing may be very well performed twice; and I have found upon a fair computation, that all the horſehoeings of the four years, do not amount to ſo much as the handhoeings, and this expenſive digging by the ſpade.

The vines will be in a better condition all the time in the horſehoeing method, becauſe the ground is kept in better tillage, and in this fourth year there will be the advantage of giving them a new ſupply of nouriſhment juſt when they want it, for the perfecting of the fruit.

We ſuppoſe our vineyard now in the fourth ſummer, in the common way the ground has been dug up this ſpring; in the new method, it has been carefully wrought with the hoeplow, the conſequence is much the ſame: the uſeleſs ſhoots being rubbed away as they appear, and all the nouriſhment conveyed to the fruit, it ſwells and makes the firſt advance toward ripeneſs favourably: but it requires more nouriſhment, and better, to perfect it from this middle ſtate of growth, than it did to bring it ſo forward.

All ground, from the time that it is tilled, grows more cloſe and heavy again till the next tillage; from the ſpring digging to the beginning of Auguſt this ground has been therefore growing worſe and worſe; it has thus far furniſhed the grapes, but they now want moſt ſupply, and it is leaſt in a condition to give it. Little or nothing can be done in the common way to aſſiſt it; but in ours, juſt at this needful time, the hoe plow can be ſent into the ground; and this muſt never be omitted.

The conſequence will be ſurpriſing. In the firſt place all weeds are torn up and deſtroyed by it; and this is no ſmall advantage; beſide exhauſting part of the nouriſhment at a time when the vines want it all, they thicken the air with vapours: for all plants perſpire. This is the worſt accident that can happen to grapes ripening in England. In other countries the air is drier than in ours, and that is one great cauſe of the ſucceſs of their vineyards. We have an air naturally too damp to combat with; and having as much as poſſible avoided this in the choice of ground, we ſhall now do the growth a moſt acceptable ſervice, by clearing away all other plants which grow among the vines, and would, in ſome degree, infect the air by their perſpiration.

This is one advantage of a good horſehoeing given to the vineyard in the beginning of Auguſt: but the greateſt is the ſupply of nouriſhment, given by it to the fruit, juſt when it is moſt wanted.

We know fruits may be nouriſhed by manure and watering, but the vine is an enemy to both. The ſweeteſt nouriſhment for all fruits, ariſes from a good tillage of the ground alone, and this is the only aſſiſtance of that kind, the vine will receive with benefit: this horſehoeing in the beginning of Auguſt anſwers the purpoſe perfectly. The ground is all well broken, and by this means rendered fit to receive the rains and dews: the extream fibres of the roots are broke off, and twenty or more new ones are ſent out into the freſh dug mould in the place of one. Theſe all receive juices for the fruit; and thoſe juices are meliorated by the ſun's rays warming the ground in which they run.

We have ſhewn the miſchief that ariſes from the roots of the vine piercing too deep into the earth: the juices they imbibe are cold and poor: the only proper nouriſhment is what they draw from mould which lies within the influence of the ſun.

The roots of the vine in their extream fibres naturally puſh downward, and there is nothing ſo diſadvantageous to the grape, for theſe extream fibres draw the principal nouriſhment.

Now in the laſt horſehoeing of this ſeaſon, this is naturally and moſt happily remedied. The plow piercing to a conſiderable depth of the ſoil, tears off the roots at that part, where they would run deeper; and thoſe fibres which would have drawn a cold and hurtful nouriſhment for the vines, are thus cut off. The plow which has come under the roots, whoſe ends it thus tears off, gently lifts them up, and in its natural courſe ſpreads them horizontally in the new broken earth, nearer the ſurface, and conſequently in a part where they are in the reach of the ſun.

Every thing is thus done that can be wiſhed for the filling and perfecting the fruit, and with the advantages named already of an open ſpot and diſtant plantation, this gives the benefit of more favourable climates. The ſoil is proper in its kind, and it has all the advantages of tillage. It is new wrought juſt when the grapes are coming to maturity; and the deep fibres of the roots being taken off, thouſands, indeed millions of new ones are ſent out from the ends of the others, and theſe run horizontally, or nearly ſo, in a freſh ſoil, warmed by the ſun beams. They therefore attract a fine and abundant nouriſhment, for the freſhneſs of the ſoil always gives that; and they lie ſo, that this can be warmed and improved by the ſun before it is carried up into the fruit.

CHAP. XII.

Of gathering, cutting, and preſſing the firſt produce.

THE firſt year's fruit in a vineyard is uſually ſmall in quantity, and inferior in quality to what it yields afterwards; but in the management we have directed, there will be leſs of this difference than would otherwiſe happen. It is, however, a very comfortable aſſurance the proprietor may give himſelf, that every year, ſo long as he lives, his vineyard, if he continue the proper management, will produce more grapes, and thoſe better than the laſt.

What is to be farther done this firſt ſeaſon, is this. When the grapes have acquired their full bigneſs, the ſtalks on which the branches grow, ſhould be cut about one third part through. The reaſon of this practice, whoſe uſe we ſee plainly in common wall grapes, is this. The quantity of nouriſhment that was required for ſwelling the fruit and bringing it to a due fulneſs, is no longer needed now; and the more comes in, the more difficultly will it be ripened. Therefore, by denying paſſage to a third part of the juice, which would naturally come into the fruit, our languid autumnal ſun will be the better able to ripen what there is. When the grapes have in this method attained all the perfection whereof they are capable, let them be gathered with care.

They are to be preſſed, but that ſhould not be done immediately. It is not the method uſed with any fruit, from which a vinous juice is expected; and why ſhould the grape, which is the tendereſt and moſt delicate of all, be denied the management which we allow to the moſt common.

In the cyder counties, when the apples are gathered, they are not carried immediately to the preſs; for if they were, we very well know how poor a juice they would yield. They are laid up in heaps to ferment a little within themſelves, and their juice is thus rendered more pure and ſpirited than while it was growing.

Even in the pears and apples which are gathered for keeping during winter, for the ſervice of the table, the ſame method of improving their juices is employed: and experience ſhews, that without it, they will neither keep ſo well, nor have their proper flavour. Thoſe which are preſerved in jars, or baſkets, are not put into them from the tree;

tree: they are piled up together in heaps and covered with flannel, and after they have thus lain to ſweat, as it is called, they are of a finer flavour, and are proper for keeping.

What is thus done for the apples and pears intended for cyder and perry, muſt be allowed alſo, ſo far as the nature of the fruit will permit, to the grape.

We have begun the practice by cutting through part of the ſtalks as the branches hang upon the vine, and being gathered, they muſt alſo have time to mellow before preſſing.

The grape is of a tender ſtructure, and cannot be thrown in heaps as pears and apples; and even if ſpread upon the ground, it will grow mouldy where it touches. But its natural ſtructure in the bunch gives us an opportunity of eaſily hanging it up; and this way it will obtain all the expected improvement.

Let ſome lines be ſtretched acroſs a barn, and the bunches hung upon theſe at a ſmall diſtance from one another. The air ſhould have its free courſe through, and the fruit will thus in a few days paſs through that natural and requiſite condition of ſweating and evaporating the more watery part of its juices, and improving the remainder by this ſoft and gentle fermentation. They ſhould hang about a fortnight in this manner, and they will then be fit for the preſs. This we ſpeak with regard to the huſbandman who plants his vineyard for the immediate profit; and can allow no farther attention to the ſubject, than the preſſing and ſelling the juice. For the gentleman who intends the vine for his own table, they may have a week longer with great advantage.

The huſbandman will have his juice leſs in quantity the longer the grapes hang, but he will be no loſer by this, for the quality will be ſo much improved, that it will bring him a better price.

Without this care the wine cooper will not find it anſwer his purpoſe, and the huſbandman will be obliged certainly to abate his demand; and probably will loſe his cuſtomer.

This I have ſeen in England, where the ruin of a large vineyard, which might have brought great advantage to the owner, was the conſequence of preſſing the grapes immediately from the vines.

This time and management muſt be allowed the grapes by him who raiſes them only for ſale of the juice; and this is our material conſideration; we ſhall therefore proceed to the management of the vineyard for the following years. but having gone through that article, we ſhall lay down the management of the fruit in a particular manner for the ſervice of thoſe who intend to make good wine in England; and give the whole proceſs.

CHAP. XIII.

The management of the vineyard during the following years.

THE next care after gathering the grapes, is the autumnal pruning of the fourth year. This is a very material article, for on the judgment that is employed in it, will depend the ſucceeding years ſucceſs.

The roots are now ſo eſtabliſhed, that very luxuriant growth of branches muſt be expected; and this the knife is to retrench.

The common error is leaving on too much bearing wood; and the temptation is great, becauſe the more fruit will be produced: but the roots will be impoveriſhed by too large a bearing; and the juice of this greater quantity will be poor, and of leſs value than a ſmaller quantity which the roots could better feed, and the ſun more perfectly ripen.

We ſhall allow the huſbandman, who raiſes his vines for the ſale of the juice, to leave on ſomewhat more wood than we adviſe the gentleman, who intends wine for his own table: for without exception the ſmaller quantity his vines produce, provided they are well nouriſhed and kept in good order, the better the wine will be; and in the ſame manner, the more he diminiſhes that quantity by leting the grapes hang after they are gathered, the richer it will be.

The fault of Engliſh wines is their poverty: thoſe who will be content to make leſs, will avoid that imperfection. The better care is taken of the vineyard, the more wood may be left upon the vines. In the way we have propoſed of large diſtances, the hoe plow and no intermediate growth, each vine may very well be allowed ſix branches, and of theſe, the two upper ones, may have ſix buds or eyes left on in the pruning, and the four others, four buds each. This will lay the foundation for a larger ſtock of fruit than vines are allowed to bear even in the wine countries; but the ſupport from the horſehoeing method will be ſufficient to bring all theſe to perfect maturity.

In England it has been the cuſtom to leave on a great deal more bearing wood than this; and that with a very indifferent management of the ground: there can be no wonder, that in this caſe the produce has been poor, raw and watery. This ill practice has brought diſgrace upon the wines of England; and many have given up the hope of ever ſeeing good made here; but whoever will follow the attempt upon theſe principles, underſtanding the reaſon of all he is expected to practiſe, and obſerving it regularly, he will find to his own ſatisfaction, and may inform the world, that the fault has been leſs in the climate, than in the conduct of the vineyard.

The weeds having been deſtroyed by the Auguſt horſehoeing, there will not be any of conſequence afterwards for that ſeaſon; ſo that when the pruning is over, the vineyard may be left for the winter.

The laſt week in March the hoeplow muſt be ſent in again; and it will be a great advantage to dig up with a ſpade, the ſpace between vine and vine in the rows where that implement could not come. Then the ſtakes ſhould be examined, and the tyings, to ſee that all be in good order and ſecurity. And after this, the ground may be left to the middle of June.

It ſhould then be again horſehoed, and a third time in Auguſt, and this is all the management it will require for a conſiderable time. But in the courſe of things in this world, nothing can remain long without a tendency to decay. If the vineyard had no recruit of materials, it would by degrees be exhauſted. Many ſuppoſe the immediate nouriſhment of plants is the ſubſtance of the earth itſelf in fine particles; and if this be the caſe, the cauſe of a piece of ground being abſolutely exhauſted by a crop continuing long upon it, is very plain. Even the horſehoeing method, if all were true of it which its enthuſiaſtick promoter, Mr. Tull advances, would not for ever ſupply the vineyard with nouriſhment. He ſays, corn may be raiſed for ever on the ſame field without manure by this method of huſbandry; but if this were literally true, it would overthrow his whole ſyſtem. If he only means for a great number of ſucceſſive years, uſing for ever figuratively, ſtill though that ſhould be true of a corn field, it will not anſwer in the vineyard.

His method is by ſowing every ſucceeding year's corn in the centre of the laſt years interval or ſpace between the rows; ſo that it really does not grow any two years upon the ſame ſpot of ground, though every year in the ſame field; but in the vineyard we can have no advantage of this change of place for the crop: becauſe the vines muſt ſtand all the time where they are firſt planted; and their long ſtanding is indeed their greateſt advantage.

The horſehoeing method makes the ſoil laſt ſerviceable much longer than any other practice could, becauſe it keeps down the growth of weeds which would exhauſt it, moſt effectually; becauſe it expoſes the mould frequently with a new ſurface to the rains, dews and air, which are its true and great invigorating principles; but moſt of all, becauſe in theſe large intervals, it continually changes the quantity of mould which lies about the roots of the vines, and is exhauſted by them.

For theſe reaſons, the horſehoeing huſbandry will continue a well choſen piece of ground a long time, in a condition to ſupport the growth of the vines: but when we conſider the original preparation of the ground, we ſhall find it muſt by degrees decay, and that a recruit muſt and will be wanted.

The quantity of ſoil was originally not very great, for it was an eſſential article to chuſe a piece of ground where there was not too much depth of it: the vineyard lies on a deſcent; and conſequently, if we allow no abſolute waſte of the mould from the plants themſelves, the rains will in a ſucceſſion of years, waſh ſome of it away. The mould is often broke, and the water, which falls in ſhowers, has a free courſe off down the intervals: it will run off thick and muddy, and this mud is no other than the fineſt part of the mould of the vineyard. This is a continual waſte, and there is no new ſupply: the vineyard therefore, which had no more than a due quantity of ſoil when firſt choſen, muſt after a few years have too little.

Another certain conſequence of the allotted culture is this. Thoſe chipings of ſtone, whoſe uſe we have explained, will, by the frequent tillage, and the power of rain and air, be by degrees reduced to powder; and no longer operate as they at firſt did. The ſoil will therefore be exhauſted and waſhed away of its richeſt mould, and a quantity of the grit of ſtone will be left in its place. The ſoil is no

longer

longer what it was, and conſequently, if it was well choſen at firſt, it will be improper now.

Here then is the evident neceſſity of a recruit; it will be required the ſooner where the ground has a greater deſcent; and in thoſe vineyards where the rows are at leſs diſtances than in ſuch as have the ſpot better choſen, and the plantation made upon rational principles: but ſooner or later it will be required in all. And the method of giving it is this.

CHAP. XIV.

Of recruiting the ſoil in a vineyard.

WHEN the eye finds the ſoil to be impoveriſhed, or the condition of the fruit ſhews it; the manure muſt be this. Mix three loads of paſture mould taken from under the turf, in a piece of high and not very fruitful ground, with one load of freſh chipings of ſtone from a maſon's yard; and four buſhels of lime. Let theſe be thrown together in a heap in autumn, and in the ſucceeding February, ſcatter them over the ground.

Theſe are the proportions of the ingredients, and the quantity may be encreaſed to ſerve any vineyard according to its extent.

It is to lie upon the ground till the laſt week in March, and then to be ploughed in by the hoe plow, when brought into the ground at that ſeaſon in the uſual courſe of tillage. It will be, in a great meaſure, mixed with the ſoil by this firſt operation; and every time the horſehoeing is repeated, it will be more and more perfectly blended with it.

The effect will be ſeen in the growth of the vines, and taſted the very firſt year in the juice of the fruit. From this time, the uſual courſe of management in tillage and in pruning, is to be continued; and according to the nature of the ground, this refreſhment is to be repeated after a ſucceſſion of years.

Every ſpring the ſtakes muſt be ſecured. Thoſe ſhould ſtand at a foot and half from the ſtems, which are to have the bearing branches tied to them, the others for the under ſhoots near the body. The care of rubbing off all ſhoots that offer in wrong places, muſt be repeated; and the branches intended for the next year's bearing, muſt be taken off at the ends, when they have ſo much growth, and the ſeaſon is ſo far advanced, that they will not be likely to ſhoot out ſtragling branches from the eyes.

Thus is the care of the vineyard every year the ſame; and being once underſtood, it will be performed afterwards, by the moſt ignorant labourer, with eaſe and regularity. The time loſt at firſt in the three years growth of the vines, before they bear fruit, is all that is loſt; and each ſucceeding year will make ample amends for that: the expence of the horſehoeing is all that can be reckoned of conſequence, and this comes very cheap, becauſe the ſoil being light and looſe, it is performed with great eaſe and expedition.

With regard to the gathering and hanging up, women may perform that; and the preſſing is an article ſcarce worthy being brought into the account.

Although no error is ſo great as that of deſiring too much fruit, the quantity which will be produced in a regular management this way, is vaſtly beyond what they might imagine, who have not had opportunities of obſerving it: and the firſt profit, when the juice is ſold as it comes from the preſs, is equal to what could be obtained by the beſt crops and beſt management on this ground; and twice or three times as great as would be obtained in the common courſe of huſbandry.

This is a point at preſent of great importance, as the planting of vineyards is become an object of the attention of a ſociety the moſt uſeful in its purpoſe, and the beſt conducted of any yet eſtabliſhed in this kingdom; that for the encouragement of arts and commerce. Theſe gentlemen have extended their care to the American colonies; and rewards will be given to thoſe who moſt ſucceſsfully ſhall manage vineyards there.

It is an object of great conſequence to the kingdom; for there is no queſtion, but in the extent of that vaſt ſpace, there will be found many places where vines will ſucceed as well as in ſome of the countries, whence we have now excellent wines. I ſhall be happy, if this detail of the culture, and management of the ground, may be of uſe to thoſe who ſhall there, as well as in England, make the experiment.

Agriculture, which in England, has made but very ſlow advances toward perfection; is there yet in its infancy: and perhaps the methods, by which this, and the ſeveral other branches of it, are to be improved, will meet with an eaſier introduction there, becauſe they will have fewer prejudices to oppoſe.

The new huſbandry with the horſehoe, is not only very happily calculated for this purpoſe, but is ſucceſsfully uſed in the vineyards of many countries, whoſe produce we admire: and they who bring it into practice for one article, will ſoon uſe it for others.

CHAP. XV.

Of making of wine.

THE huſbandman who plants his vineyard for the immediate profit, by the ſale of the juice, has before him, in the preceding chapters, all that he need regard upon this ſubject. But there is yet a great deal to be ſaid to the gentleman planter, who having leiſure and opportunities, will employ them in perfecting the juice of the grapes thus raiſed, into wine: he may very likely arrive at a degree of perfection much exceeding what he conceives at firſt, for the materials are before him, with which very fine wines are made in other countries; and with the ſame care, there is no doubt but very good, if not equal to the others, may be made here.

We have given the firſt caution, which is, that he do not ſpoil all, by endeavouring to get too much. This care is to go through the whole operation, from the pruning of the vines, to the finiſhing of the wine.

The huſbandman, who is not concerned in this article, may, at one or two gatherings at moſt, clear his ground: nor will the perſon who buys his juice find fault on that account; but where the perfection of the wine is intended, there ſhould be many gatherings. One preſſing will anſwer to all theſe, for though the bunches be gathered at ſeparate times, they may be kept ſo long hanging, that all may be preſſed together.

Reaſon directs us not to gather the grapes too ſoon; and it is as wrong to let them hang too long: but this is a danger to which we are not much expoſed in England. As we have ſeaſons however, in which grapes of the earlier kinds ripen before the end of autumn, it is neceſſary to add, that when this happens, they muſt be gathered accordingly, and not left upon the vines; for the ſtrength of the juice will evaporate after this, and they will be continually of leſs and leſs value.

For this reaſon, when the time for the firſt ripening is come, let the vineyard be watched, and let lines be drawn acroſs a barn at diſtances, for hanging up the bunches. Though no ſun muſt be admitted, there muſt be a free and dry air in this place.

In ſome of the wine countries their grapes will bear hanging up in the ſun, after they are gathered; but ours will not without damage; there it is only improving the juice, with us it ſpoils, and renders it vapid. The reaſon is plain, the grapes have there had more of the ſun while growing, and therefore they can bear it better afterwards.

The method therefore in an Engliſh vineyard muſt be this: let the ſtalks be half cut through at the time we have directed the huſbandman to cut them through a third part; and after this, as they ripen, let them be gathered, and hung up.

The time of the day for gathering is a very important article, and a great deal of advantage is loſt by not regarding it.

All fruit grows ſoft, and in ſome degree vapid, by the heat of the ſun, and there is great difference between the condition of the ſame peach; for inſtance, at two o'clock in the afternoon, and at eleven in the morning; but much greater between its condition an hour after ſun-riſe, and two hours after mid-day.

We are particular in our directions, becauſe what appear to be little articles, determine the goodneſs of the wine, and that we may carefully obſerve, we ſhall endeavour to make ourſelves perfectly underſtood. The difference in fruits is obvious at theſe hours, and the cauſe is this.

Plants are nouriſhed by their roots, and by their leaves. The roots draw their juices from the earth, the leaves from the moiſture in the air. The heat of the ſun ſets theſe in motion; but it alſo evaporates them.

From the time the ſun begins to ſhine with ſtrength, the leaves droop, and the fruit grows flaccid; this begins two or three hours after ſun-riſe, and continues till near ſun-ſet. In all this time the fruit evaporates more than it obtains, for the power of the ſun upon it is great, and the ſame heat drys the earth near the ſurface, where the roots ſhould obtain their juices, and evaporates that moiſture in the air which ſhould ſupply the leaves. Therefore the fruit being at once exhauſted of the nouriſhment it has, and denied the means of freſh, grows ſoft, and in ſome degree dead. This happens from the time the ſun has power in the morning, till it loſes it in the evening: and all this part of the day fruit grows worſe and worſe.

As ſoon as evening comes, the chillneſs of the air ſtops the evaporation; and both the earth and the atmoſphere abound with moiſture for nouriſhment. This continues through the night, and all this time the fruit is gathering again ſtrength and fullneſs.

At the time of ſun-riſe, it is in perfect fine condition, and continues ſo till the heat has again power upon it. Juſt at ſun-riſe the grapes will be wet with the dew, which will ſubject them to mouldyneſs if gathered then; an hour after they will be ſufficiently off, and the grape will yet be for two hours longer, or near ſo much, in the full vigour of the night. This ſhews that the time of gathering it ſhould be begun ſoon after ſeven o'clock in the morning, and continued till near nine.

It will be proper to employ cheap labourers, as women, to go into the vineyard every morning at the ſeaſon, and gather ſuch as are ripe during theſe hours; they muſt be carried to the barn, and hung on the lines ſtretched for that purpoſe, and if any decayed or bruiſed grapes are ſeen on the bunches, they muſt be taken off.

The ſeveral gatherings may all be preſſed together, for the longer the grapes hang, provided no part of them begin to decay, the better; a month is, in general, a good time for the whole, or ſo many weeks counted from the middle gatherings.

All this time the air muſt have a free paſſage, and from time to time any decayed grapes that are obſerved, muſt be picked off. If either of theſe cautions be neglected, the conſequence will be great damage to the wine: if the decayed grapes ſhould be ſuffered to remain on the bunches, and the place be alſo kept cloſe, they would taint the whole.

When the quantity of grapes has hung the appointed time, let the preſs and veſſels for the wine be got ready, and perfect cleanlineſs obſerved in both. The grapes muſt be picked clean from the ſtalks, and all imperfectly ripened ones muſt be thrown away, together with ſuch as are any way damaged. There will be thus a quantity of clean, ſound, and nearly equally ripe grapes, in a condition for preſſing. This muſt be done by degrees, but ſufficient time allowed to get out all the juice.

The next management depends upon the intended colour of the wine. The ſkins give this colour, and if it be deſigned to make red wine, they muſt be mixed in the fat with the juice, and ſtand in it ſix days. If it be deſigned for white wine, this is to be omitted. Only as the ſkins will aſſiſt in bringing on a fermentation, they ſhould be put in for about eighteen hours.

The juice, ſoon after it is preſſed, naturally undergoes its firſt fermentation. If this do not come on regularly, the doors and windows muſt be ſhut up, and if this do not bring it on in a few hours, there muſt be a fire made in the room, to give more warmth to the air.

When this fermentation has come on regularly, and had its time, the wine muſt be drawn off into another veſſel, and looſely covered; and after ſtanding three days in this, it ſhould be drawn off again.

When the fermentation is tolerably over, the wine muſt be drawn off into caſks: theſe muſt be quite filled, and the bung-hole muſt be left open.

Some degree of fermentation will ſtill continue; and there will riſe a ſkum upon the wine. Great care muſt be taken not to break this, or mix it with the wine, for in that caſe it will be foul a long time.

The caſks muſt be watched from time to time, and ſome of the wine muſt be kept apart, ready to fill them up as they waſte; this muſt be done with great care not to break the ſkum, and they muſt be kept conſtantly full.

Five weeks after the putting the wine into the caſks, a bung ſhould be prepared, with a pewter pipe of two foot long in the middle of it. This bung ſhould be put into the bung-hole, and thus the opening will be much leſſened. Some wine muſt be carefully poured into the tube, till it is full half way up; and it muſt be kept in this condition as it waſtes.

The place where the caſks are kept muſt not be too warm, for that will continue the fermentation longer than it need be preſerved, and the wines will be the worſe for this.

When the fermentation is perfectly over, the wine is to be ſtopped down; and will require only time to perfect it.

Many articles muſt concur to make good wine any where: and the leſs favourable is the climate, the more care is required. We have directed a ſtrict attention to all the articles which tend to improve or to hurt wines; and may promiſe, that he who follows them carefully, will not fail to make ſuch wine in England, as none will be brought to believe was made there.

CHAP. XVI.

The care of wines in the cellar.

IT will be neceſſary ſometimes to draw off the wine from the caſk into another; and the beſt time for this is toward the middle of winter, chuſing, for the purpoſe, a ſtill, calm day. This takes it off from the lees; and if it be required, the ſame may be done again in February. After this it may ſtand till the time of bottling.

If there be any foulneſs in the wine the laſt time of drawing off, ſome iſinglaſs will prove a remedy for that fault. About two ounces is enough for a hogſhead, and it ſhould be firſt carefully melted in ſome of the wine, and then mixed with the whole in the new caſk, ſtirring it together with a long ſtick.

After this, the wine will become in a little time perfectly clear, and with right management will be in no danger of more fermentation or foulneſs.

The coolneſs of the cellar where it is kept, is a great article, while in the caſk; and when it comes to be bottled, the weather in which that is done has great effects.

A damp air, whether it be warm or cold, will greatly hurt the wine; for it is and muſt be expoſed to the effects of the air in bottling. Therefore never let this be done but when the air is dry and the wind in the northern quarters. Neither cold nor heat are of any great conſequence in this reſpect, provided the temper of the air be regarded.

When bottled, let a great deal of care be taken to cork it well, and it is a good caution to cut down the tops of the corks ſmooth, and ſeal them over. Then let the floor be covered three inches with dry ſand, and lay the bottles ſloping on it. Saw-duſt is generally uſed, but it is apt to heat in ſome places.

ADDITIONAL ARTICLES
IN
HUSBANDRY.

CHAP. I.

Of the proper time of cutting wheat intended for ſeed.

ACCORDING to the nature of the wheat and the ſervices for which it is intended, the judicious farmer ſhould chuſe a different degree of maturity for the cutting of it. In general in England we let corn ſtand to be ripe before we cut it than they do in other parts of Europe. We are fond of alterations, which we naturally take for improvements; but they do not all deſerve that character. The Italians, who cut their corn before it is full ripe, follow the practice of the old Romans, who managed the ſame fields: and though our cuſtom of letting it ſtand longer be better ſuited to the nature of our climate, yet it is not always beſt: let the careful farmer follow theſe rules. Let him examine the condition of every field before he reſolve upon early or late cutting of it; and in ſome caſes let him alſo conſider the uſe for which he intends the grain.

The two uſes of wheat are for ſeed, and for ſale. In general, that which is for ſale ſhould be cut earlier than what is for ſeed: and as a change of ſeed is highly uſeful, he will do well to eſtabliſh a correſpondence with ſome honeſt farmer at a diſtance, and agree mutually to ſelect the moſt proper wheat as it grows for ſeed for each other; and to let it ſtand ſomewhat longer than they would ſuffer any other to be upon the ground.

No ſeed of any kind will grow favourably that has not been fully ripe before it was gathered: therefore the wheat intended for ſeed, ſhould ſtand its full time upon the land.

The firſt hardening of ſeeds is a great article in their preſervation with reſpect to growth; and they never receive this firſt hardening, ſo well as in the ſtate of nature.

Any fermentation which comes on in a ſeed after it has been gathered, endangers the principle of life in it; and this is more likely to happen when the plant has been cut before its ſeeds were perfectly ripe, and they have therefore been expoſed to the air before duly hardened, than when they have been firſt put in a condition to reſiſt its influence by a natural drying on the plant.

Thoſe ſlight fermentations, which happen from various temperatures of the air while corn is lying on the ground, or is in the ſhock which was cut before fully hardened in the ear, do not at all affect it in any other ſervice but this of ſowing: but the principle of life is ſo delicate, that it is often deſtroyed or weakened by what makes no other ſenſible alteration in the ſeed itſelf.

This points out to the farmer the neceſſity of a particular regard to the corn intended for ſeed; and there is alſo another ſubſtantial reaſon; the wheat for ſeed is probably to be thraſhed as ſoon as brought in or very ſoon after; and if it be not well hardened in the ear, the grains will be bruiſed by the flail, and this way damaged in reſpect of the principle of growth.

Due hardneſs of the grain is the great preſervative, and this muſt be obtained by ſuffering it to remain long enough growing; and by having it a due time upon the ground after it is cut.

Nature gives the gradual hardening much better than it could be obtained if the plant were cut too ſoon: becauſe the veſſels drying up by degrees, the pulp of the ſeed hardens in an equable and gradual manner.

In the hardening upon the ground after cutting, all that is done is an evaporation of the juices which are in the corn; but that which happens while the grain remains in the ear and the root in the ground, is effected partly by nature's denying the ſupply, and partly by that evaporation. In this caſe the evaporation is more gradual, and conſequently the floury part receives that condition wherein it is capable of being preſerved more gently and more ſafely.

Theſe are the reaſons of the farmer's practice with regard to his corn intended for ſeed. He ſhould ſuffer it to remain growing till it is perfectly well hardened in the ear; and he ſhould then cut it in the morning of a bright day; not letting the reapers go into that part of the field till the dew is off.

He muſt then ſee it laid ſo as it may beſt dry; and it muſt be turned oftener than any other need be.

There is ſome care required in this, but very little trouble; and upon theſe little articles as they are thought, depends the great ſucceſs of the buſineſs.

When this wheat is thoroughly dried, the ſooner it is thraſhed the better; and the benefit will be largely ſeen in the crop raiſed from it.

CHAP. II.

Of the beſt time of cutting wheat for ſale.

THE ſeed wheat being conſidered ſeparately; we may now treat of the reſt of that crop: and in this the owner will find more depends on the time of cutting than many imagine. Wheat which is cut when the grain is full ripe in the ear, has no advantage, except in the intent of ſowing over ſuch as has been cut three or four days ſooner; and there are manifeſt reaſons why it ſhould not be ſuffered to ſtand ſo long.

Every part of this valuable corn has its uſe and price, and though the grain is ſo far ſuperior to the chaff or ſtraw, that it would be ridiculous to think of theſe at the expence of hurting the main product; yet, when they can be rendered better without injuring the grain, this is worthy the farmer's attention.

Let him underſtand the operations of nature. The growth of plants terminates in the ripening of their ſeeds. This is the final purpoſe in their production, and when this is atchieved, the root periſhes.

While the grain in an ear of corn is growing, its huſk and the ſtalk are full of juices; but as ſoon as it is ripened, nature ſends up no more nouriſhment, and theſe parts decay.

Therefore, when the corn is not fully ripe, the ſtraw and chaff will be good, becauſe they are parts of a growing plant, but when the corn ſtands till the ſeeds are full ripe, theſe parts are withered and uſeleſs.

Now it appears from experience, that the grain will be as good if cut a little before ripeneſs, and this will give that quality we wiſh to find in the ſtraw and in the chaff. It is for this reaſon a good practice in general, except where the wheat is for ſeed, to cut it down a few days before the full ripeneſs. It will harden upon the ground as well as in the growth, and the corn will be as good while the ſtraw and chaff are better.

But beſide this general reaſon, there are particular caſes in which the early reaping of wheat is very beneficial.

Ours is ſo uncertain a climate, that we are never ſure of good weather. The damages which corn gets by wet, when it lies upon the ground, is very well known: but this is greater if the wheat have been fully ripe before cutting, than when it has been reaped a little before. The reaſon is plain, that corn which has ſome moiſture in itſelf, will get leſs damage by a little added from accident, than ſuch as was before perfectly dry. In corn cut a little before ripeneſs, the wet preſently is evaporated from the ſurface, and the flour gets no harm; but when full ripe corn is wetted on the ground; the quality of the flour ſuffers, and the weight is found alſo to be leſſened.

In many caſes the bad condition of a field pleads for cutting down the corn earlier than the uſual time; and there is always an advantage: when corn is blighted, the beſt method is to cut it at once, though it be far from ripeneſs. As ſoon as the blight has taken full hold, the plant receives no more nouriſhment from the root; the ſtalks grow ſoft, and afterwards break with the leaſt touch.

The beſt way is to cut this directly, and it may be then managed upon the ground while the ſtalks have ſome ſtrength. The condition of the roots, which are looſe in the earth, will not admit of its getting any farther benefit thence; but when the new cut ends of the ſtalks are expoſed to the air, they imbibe a great deal of moiſture from it; and the grain ſwells in the ear for many days.

The quantity from ſuch a blighted crop will be much larger by this management, than it would have been if it had remained upon the ground; and the quality will be yet more improved than that.

One caution to be obſerved in regard to ſuch crops is, that the corn muſt be threſhed out as ſoon as it is in proper order; for it gets harm by being kept in the ear.

A ſecond cauſe for cutting wheat ſometime before it is fully ripe, is, when from neglect, ill management, or unconquerable accidents, the ground is weedy. In this caſe it is neceſſary that the corn ſhould lie out for the weeds to wither. And this it will much better bear when cut three or four days before ripe, than when it has been kept on the ground till the corn is hardened to a full degree in the ear. We have obſerved that corn, not quite ripe, bears the accidents of weather after cutting, better than ſuch as is fully mature: this is a condition in which the grain muſt be expoſed to the weather longer than clean crops need, and it is therefore much the beſt method to take the advantage of cutting early.

The differences in the kinds of wheat, alſo make ſome variation adviſable in this matter. The ſeveral ſpecies we have deſcribed already, and theſe do not all require the ſame conduct. The white wheat will bear to be left longer on the ground growing than the red, for the grains are firmer in the ear. On the contrary, the red wheat gets more good when it is cut; and for that reaſon, ſhould be reaped ſooner in the growth and left longer, and more carefully attended in the hardening.

The roots of the white wheat ſupply nouriſhment longer to the ear, and therefore there is advantage in leaving it longer growing. Theſe things experience teaches, and the farmer has no guide ſo certain. In red wheat, when the ſtalk begins to grow dry, the growth of the ear is at a ſtand, and therefore it ſhould be cut at that period; for we have ſhewn before, that the new cut ſtalks of corn will take in a great deal of nouriſhment from the dews and air, when the root would have ſupplied no more.

As this kind of wheat ſucceeds beſt if cut early, it will in that caſe, require longer attendance as it lies on the ground, but the expence is very trifling proportioned to the advantage.

The courſe of nature in all kinds of grain and other plants with jointed ſtalks is this: when new cut the veſſels of the ſtalk are open, and they take in more nouriſhment from the air, than the roots would at that time from the ground; for the extream fibres begin to decay when the grain has got its growth in the ear, and ſoon after the root periſhes entirely. So long as theſe veſſels continue open, and the knots or joints of the ſtalk retain their freſhneſs, the nouriſhment is thus received, and carried directly up to the grain in the ear. All that is received muſt of neceſſity be carried thither, becauſe the leaves, the huſks, and every other part, are now paſt the period of their growth, and are withering. Therefore, ſo long as this condition of the veſſels of the ſtalk continues, there is an addition to the inner part of the grain; that is, the flour is augmented in quantity; and the encreaſe, for the reaſons given already, is much greater than it would be if the plant continued growing: afterwards the effect of the air is only to harden the grains, for when the knots deny paſſage to the juices, the ſtalk receives them in vain.

It is common to let white wheat ſtand ſo long before cutting, that theſe knots are dried while the plant is growing. But they obſerve a better practice, who cut even that kind while thoſe parts retain ſo much of their nature, that juices can paſs through them; and in regard to the red wheat, it is a rule with experienced farmers, always to cut it while theſe joints retain their freſhneſs. It ſhould never be ſuffered to ſtand longer in any ſoil; and in the drieſt lands it ſhould be cut ſooneſt, becauſe in thoſe ſoils, the extream fibres of the roots dry up and decay earlier than in others.

If the weather prove damp while the corn lies on the ground after cutting, there muſt be a great deal of care in turning it; and in that caſe the grain will not ſuffer. The ſtraw will be the worſe for it, but that is a ſmall conſideration.

CHAP. III.

Of the proper time for cutting barley.

THE corn kinds are all ſo nearly allied in their ſtructure and manner of growth, that what is true of the one, will in a great meaſure hold good of the reſt. The principal difference between barley and wheat in the ſtructure of the plant, is, that the ſtalk of barley has the ſap-veſſels ſmaller. This is a reaſon why barley will have the ſame benefit from cutting a little before it is ripe as wheat, and why it ſhould be ſomething ſooner cut than that grain, becauſe the ſmaller the veſſels are in the ſtem, the ſooner they will be dried up, and incapable of conveying nouriſhment to the ear.

There is alſo a particular reaſon of cutting barley unripe, from the ſervice it is in great part intended for, which is the making of malt. This proceſs depends in a great meaſure on ſoaking the corn in water, for the ſwelling of the floury part. All corn, while it lies on the ground after cutting, is liable to rains and wet; and he who conſiders the expectation of wetting his barley afterwards, will not chuſe that it ſhould be anticipated while it lies upon the ground.

This is a reaſon for cutting this kind of corn before it is ripe. For if wet happens while it lies in that ſtate, the damage will be little. It is the wet lying upon the ripe grain alone, which can occaſion the damage.

Barley cut at the exact time when the ſtalk is beginning to harden, will ſwell and grow perfect in the ear, as it lies on the ground, and after that will gradually dry and harden without diminiſhing: the contrary of this I have ſeen very plain, in barley which has been let to ſtand till full ripe, eſpecially when there has been any conſiderable quantity of rain a little before. The grain, which in this caſe had been ſuddenly ſwelled, and was now hardened in ſome meaſure in the ear, has ſhrunk in bulk in a very ſurpriſing manner. What has been ſaid of wheat, with reſpect to the ſeaſon of the year, holds full as well of barley, namely, that in a dry ſummer it will require to be cut ſooner than in a wet one. The whole depends upon this ſingle principle, that the root is of no uſe when its extream fibres decay, which they always do before the perfect ripening of the ſeed; and at that time when they have firſt loſt their office, there remains yet in the ſtalk a power of receiving nouriſhment from the moiſture of the air. This ſhould by all means be allowed for the full ſwelling and ripening of the grain, and there is no way to give the plant that benefit, but by cutting it at that exact time when the root has done ſupplying it with nouriſhment, and the ſtalk is yet in a condition to renew this ſupply, and to convey it up to the ear.

The true method of finding this condition of the plant, is by examining the ſtalk; for when the fibres of the root begin to decay, that grows leſs juicy than before. It is ſtill in a condition to receive nouriſhment, and to ſend it to the ear, though the root does not ſupply it; the air has enough of this nouriſhment, but it cannot be received by the ſtalk in the needful quantity, unleſs that be cut off from the root. But in this caſe the whole proceſs is performed properly and uſefully.

We ſee the ſtalks of bulbous rooted flowers being cut from the root, and ſet in water, will keep the plant alive a great while. The ſtalks of corn are in the ſame manner qualified to receive nouriſhment from the air, and to ſend it up to the grain. It is but for a limited time they can do this; but taking the advantage when it is required, this is ſufficient; and after they have thus fed the grain, it dries and hardens leiſurely, without that diſadvantageous ſhrinking which we have mentioned, as happening too often in corn cut when full ripe. A poor thin crop of barley ſhould be cut earlier than one which is fuller and richer, for in theſe poor crops, the roots decay ſooner, and the grains therefore ripen the leſs perfectly. The obſervation we have made, that in dry ſoils the roots decay ſooner than in moiſt, gives the reaſon of this; for in thin growths the ſun-beams find free paſſage between the ſtems, and they parch and burn up the roots much ſooner than in fields where the ſtalks defend one another, and the ground is kept moiſt between them, by the ſhade they give to each other. In theſe crops the ſtraw dries very ſoon, if left to the full growth of the ear; and the mowers can ſcarce perform their office, becauſe of its weakneſs. In this caſe alſo the grain can only ſhrink in the ear, as it lies afterwards upon the ground, for the veſſels of the ſtalk are faded, which ſhould have given it the needful ſupply.

CHAP. IV.

Of the beſt time of cutting field peaſe.

THE doctrine here advanced, of plants receiving a certain portion of nouriſhment from the ſtalk, when the root is no longer in a condition to ſupply it, is verified in the pulſe kind, as well as in corn: and the practice deduced therefrom ſhould be obſerved as regularly.

All theſe are annuals as well as barley; and when the ſeed ripens, the root decays. This is the courſe of nature; but in cultivated ground, where the ſoil is light, it withers ſooner. In the common courſe of things, the ſurface of the earth about a plant in the fields is hard, and this defends the fibres of the root from the ſun, as long as is neceſſary for the perfecting of the ſeeds: this is the courſe of nature, and when we vary from it by culture, we ſhould provide accordingly. The opener a ſoil is, the eaſier the ſun gets admiſſion into the ſurface, and the ſooner the roots, which have nearly performed their office, decay. We ſee that the ſtalk when freſh cut will, for ſome time, ſupply the place of the root at this period; therefore in the pulſe kind, as well as the corn, we ſhould take that opportunity of cutting the crop.

When the beans or peaſe intended for keeping have acquired their full growth in the pods, and before they begin to harden, is the exact time that the plants ſhould be cut up. The conſequence of this is giving them a ſupply, which they would not have had from nature, for the roots could not have given it; and they will thus be larger and more plump, and will dry more ſound, and keep their colour much better.

This laſt is an article of conſequence in all the pulſe kind, but eſpecially in that pea, called the blue pea; this will turn black, if ſuffered to ſtand till over ripe upon the ground; but if it be cut as ſoon as of a due ſize in the pods, the peaſe will ſwell, and fill properly in lying, and will preſerve their colour afterwards in keeping.

CHAP. V.

Of the various mixtures of natural earth.

WE have obſerved, that pure mould or mellow earth is the great article in the richneſs of ſoils; and that all the good kinds partake more or leſs of it; to the characters already given of this, may be added its ſmell, which is one of the moſt agreeable that can be conceived: we ſhould accuſtom ourſelves to diſtinguiſh this, and know regularly what it is that we may, from its prevalence or weakneſs in a ſoil, know what is to be expected from it.

There is much more in this than is uſually imagined; the qualities of this pure earth are greater and more eſſential than are commonly ſuppoſed, and it is this, or the particles of this ſeparated by the roots of plants, from the other mixtures wherein they have been lodged, that Mr. Tull and his followers mean, when they ſpeak of earth as the nouriſhment of plants.

That this fine and pure mould has a ſmell, all know who are accuſtomed to huſbandry; and the phyſicians of older time, who ſought more natural and more effectual remedies than chemiſtry now furniſhes, were acquainted with it. They ordered their patients, in many caſes, to follow the plow in dry and rich ſoils; and cures were performed by the breath of their common mother.

The plowman knows this difference between good and bad ground ſtill: he is well acquainted with this ſcent, and when he enters on a field at day-break, can tell from the vapour of the ground, while he turns it up, yet moiſt with dew, whether his maſter may or may not expect a plentiful harveſt.

Whatever it be that occaſions this ſmell to ariſe from the fine pure mould, wet always favours our perception of it. The ſame earth which chears the plowman at early morning with its healthy odour, has little ſcent when he turns it dry at noon; and at any time, a ſhower of rain diſcloſes the ſmell to the traveller. In the garden it is not to be ſought, for dung has there defiled the pure ſtate of the earth, and ſends up its own rank vapour in its place. It is for this reaſon the field produce, in roots and plants for the table, ſo much exceeds in ſweetneſs that of the ſame kinds from the garden. We find that wet ſends up the ſmell of this pure ſoil, in the ſame manner it expands its nouriſhing parts among the roots of plants; and if dung be in the ſoil, thoſe vapours go with the reſt.

It is plain from experience, that tillage will in a great part ſupply the place and uſe of that coarſe addition. And there are other manures, when ſome addition of this kind is neceſſary, which will anſwer the ſame purpoſe, without the offenſive qualities. To know theſe, and the ſoil itſelf, is the only means to apply them properly; and to what we have already delivered on that head, we have ſomething to add from the reſult of the obſervations and experiments of others made ſince that time; and from our own experience.

CHAP. VI.

Of the effect of water upon various ſoils.

UPON this principle of water occaſioning the mould to ſend up its lively and refreſhing ſmell, we can underſtand properly the effect of rains, in the nouriſhment of plants; and of artificial waterings. Water alone, we find, will ſupply ſome plants with nouriſhment; but it is by its power upon this tender and fine mould, that it ſhews the great effect. It is but a few that will be ſupplied by water only; but this quality by which water renders mould more fit for nouriſhment of plants, is univerſal.

How it does this is not difficult to be known; and upon this will depend a great deal of the proper management of ground. The parts of mould remains entire and unſeparated, ſo long as it is dry; and though the ſun and air reduce it to the fineſt duſt, yet every particle of that duſt is ſo much compact mould, whoſe principles or conſtituent parts, as chemiſts call them, are unſeparated: it is therefore duſt is void of ſmell, ſo long as it continues dry: but as ſoon as a ſhower of rain falls, the very roads, much more the fields, ſend up a moſt refreſhing odour. Therefore water can occaſion mould to diſcloſe its hidden qualities. This is done by ſeparating the particles; and this alſo puts the mould in a ſtate of giving nouriſhment and life to plants.

This principle being eſtabliſhed, let us purſue our obſervation and experience farther, for there is no way elſe of arriving at true and practical knowledge. If we go over two different fields after a ſhower of rain, the one of which has been well tilled, the other more neglected, we ſhall perceive that the more the ground has been cultivated, ſuppoſing the ſoil equal, the freſher and the better it ſmells. We learnt by our firſt obſervation, that rain diſunited the principles of mould, and thereby made it fit for the nouriſhment of plants; and we now learn, that the fineſt mould, that is, ſuch as is moſt mellowed and broke by tillage, receives this influence the moſt readily. This is very conformable to reaſon; for the wet muſt have much more power on the particles where they are thus ſeparated by often breaking the ſoil, than when they are united together into a compact body. The greateſt proof of this is the ſmell riſing from the duſt of roads after rain: this conſiſts of very barren matter, but it is broke to fine powder, and therefore the wet immediately affects it; and takes more effect on it, that it does on a better ſoil, which is moſt compact in its nature, and has not been divided by tillage.

After this examination, which ſhews in the ſtrongeſt light the condition of ſoils in their natural ſtate, as more or leſs influenced by tillage; let us advance to the conſideration of them, as improved by manures.

Mr. Tull has ſaid, and the generality of later writers have adopted it from him, that the effect of manures is the ſame with that of tillage; and that this conſiſts in breaking the earth into ſmall particles. Manures do this by fermentation: tillage does it by actual labour. This ſyſtem, which is very rational in itſelf, agrees perfectly with the doctrine here eſtabliſhed: for as there is the greateſt benefit from rain, where the ſoil is moſt divided, the fertility depending, in a great meaſure, on that, muſt alſo be in proportion influenced by the other.

Let us next examine, after a ſhower of rain, two fields of the ſame kind of ſoil, one of which has been well manured, and the other not. We ſhall find the ſame difference that we perceived in the neglected and the cultivated ground. Both fields will ſend up a refreſhing ſmell, for all earth does this after rain; but the field which has been manured will ſmell vaſtly ſtronger, than that which has not.

Dung is the occaſion of a particular exception in this place: the ſmell from a field where this has been the manure, is ſtronger than from any, though not ſo ſweet. The other manures in general break the mould, without impregnating it with their flavours; dung breaks it as much as any, but its own ſtrong ſcent riſes with it, and overpowers that of the ſoil.

There are others of the coarſe kind, liable to the ſame objection; but the principle is the ſame in all: and this ſtrong ſmell of the manure after rain, ought to be an objection to the uſe of thoſe ſubſtances which give it.

We find that all manures render the earth more eaſy to be influenced by rain; and this is their uſe; for it is the influence of rain upon the mould which nouriſhes plants. Thoſe manures, which at the ſame time ſend up a coarſe and unpleaſant ſmell of their own, with the pure fragrance of the

the natural earth, give alſo the ſame ill-flavoured particles to the plants they nouriſh. From this we are taught that the moſt genuine and wholeſome vegetables are produced on land improved by tillage only; and this is one great recommendation of the horſehoeing huſbandry: and we may learn alſo, that when manures are uſed, the beſt and fitteſt for the purpoſe are thoſe which have no ſmell or taſte of their own. Thus the improving land by additions of the earthy kind, is more wholeſome, as well as more laſting than by dung. The air never fails to excite ſome degree of fermentation in a rich ſoil, when it is turned up; and this is much encreaſed by the addition of water. The ingenious Dr. Home has obſerved, that a quantity of pure mould, dug up and expoſed to the air, ſwells immediately ſo, that the hole whence it came will not hold it: and this ſwelling is encreaſed by a moderate quantity of wet. This is a ſeparation of the parts of the ſoil, and this diſpoſes it to nouriſh plants. Whatever can effect this, gives fertility to ſoil; and that which effects it moſt perfectly, and with the leaſt alteration of the qualities of the ſoil, anſwers beſt the purpoſe of agriculture.

CHAP. VII.

Of the nature of black mould.

EARTH of this kind is far from the nature or condition of what the chemiſts call by that name. They mean a ſubſtance from which all volatile parts have been taken away, but were that the caſe with this earth, it could not ſmell with rain. We know that odours depend on volatile particles; and we ſhall find, by experiments, that this earth contains ſuch.

Authors ſpeak of ſalts, but this is a queſtionable doctrine: the firſt quality of ſalt is, that it diſſolves in water; now mould, being expoſed to continual rains, would be diveſted of its ſalt ſoon, if it originally poſſeſſed any.

But that this earth contains oily particles, is plain from reaſon and experience; and theſe, as they are happily calculated for the ſupply and nouriſhment of plants, have alſo the power of ſcent. Water may paſs through the ſoil for ever, and not diſlodge theſe particles, for oil does not mix with water. We wonder how plants obtain their different qualities and virtues from the ſame mould, which we think does not in itſelf contain any thing of that nature; but this, though a natural, is too haſty a concluſion. Bodies contain things often, of which they give no teſtimony to the ſenſes, and it is thus with mould. We can diſcover oil in it by certain experiments, though we do not perceive it immediately by the eye; and this may effect what gives us ſo much wonder.

Nitre will melt without taking fire, unleſs ſomething of an oily nature be added to it: any oily matter will, in this ſtate, make it flame, and nothing except an oily matter will; therefore we know that whatever takes this effect is oily, or that it contains an oily matter. Vegetable mould taken up where there has been no dung, will make nitre flame and burn violently. By this we know that it contains an oily matter in large quantity, though it be ſo blended with the reſt of its ſubſtance, as not to be obvious to our ſenſes. The looſe quality of this pure mould, gives free paſſage to the roots of plants; its ready ſeparation by water, and the effects of that mixture, tend to give its oily and other active parts to plants; and its open texture and dark colour diſpoſe it to receive and retain all the ſun beams, as they make it reflect fewer than any other ſurface or colour. Even light which is thus plentifully abſorbed by this kind of ſoil, is no mean agent in vegetation, though the powers of it are but newly diſcovered in this part of the ſyſtem. That which can put the parts of plants into a tremulous motion and retain them in it, is no ſmall agent in the diſtribution of their juices: that which has power to cauſe the amazing properties of the ſenſitive plant, may very well be received as a powerful efficient in the nouriſhment of ſeeds and other uſeful parts of plants.

We ſee a pure, looſe, dark coloured mould is the kind of ſoil moſt ſuited in its nature to theſe purpoſes; therefore we learn that in all our management of unfavourable ſoils, this is the condition toward which we are to attempt to bring them.

It has been ſuppoſed that this kind of ſoil contained an alkaline ſalt, becauſe experiments ſhew, that it will ferment with a weak acid, and take off the acidity. But this is an equivocal trial, for chalk and other ſuch earths will ferment with vinegar, and deſtroy its acidity; and theſe ſubſtances are much more naturally to be expected in the earth, than abſolute ſalts.

Chymical diſtillations of earth afford other ſubſtances, but many requiſites muſt concur in order to our forming a rational conjecture of the real contents of mould from this proceſs. It is hard to ſay, where mould has not been impregnated with the dung or urine, or perſpiration of larger animals, or the corrupted bodies of inſects, either of which may afford the things which the experimenter ſuppoſes to riſe from the earth itſelf.

CHAP. VIII.

Of the nature of clay.

IF we examine clay according to the qualities which we have found to be eſſential to the nature of a good ſoil, and to give that character to mould, we ſhall find it has them not. It does not readily receive water, nor break and come to pieces with it; nor do we perceive when it is wetted with rain, that freſh ſmell which riſes from good mould. It will not ferment with acids, nor alter their natural taſte, nor has it the common properties of the other earths.

There is no oil apparent in it, but its qualities render it very probable, that there is in it a large portion. Its ſoft toughneſs is like an effect of oil; and the way in which water runs off from it, is alſo very like the nature of oil, which does not admit water to mix with it on any occaſion.

Experiments fail in ſeparating this, but that is no proof it is not in the ſubſtance; for things may be ſo united by nature, as to be very difficultly ſeparated by art. What is moſt ſingular in the chymical experiments made on clay, is that it affords a ſmall quantity of an alkaline ſpirit. This contradicts the account given by chemiſts of earlier time, who ſay, there is in it a vitriolick acid: but perhaps it may not be difficult to account for this miſtake. We find in all the clay pits about London, and in general throughout the kingdom, lumps of the mineral called pyrites, from which copperas is made; this contains abundance of vitriolick acid; and perhaps this has led the chemiſts to ſuppoſe that acid was in the clay itſelf.

It is of uſe to know thus certainly and exactly the principles and conſtituent parts of ſoils; becauſe we ſhall that way be led rationally to the uſe of proper additions in the article of manures. Practice and experience are the farmer's beſt guides, but theſe do not exclude a deeper ſearch: the beſt uſe of experience is to ſelect among many things, that which has anſwered beſt; but there is need of a fund of knowledge, to know which ſubſtances ſhould be brought into the trial.

The oil in clay is ſo latent, that a lump of common clay put into melted nitre, would not make it burn; but being powdered and thrown in, ſome ſparks were occaſioned. We have theſe experiments on the authority of Dr. Home, whoſe veracity is as much above impeachment as his knowledge.

CHAP. IX.

Of new manures for a ſandy ſoil.

THE addition of clay to ſand, which reduces it into a perfect loam, is well known, and has been practiſed with the greateſt ſucceſs; and even where the ſandy ſoils are pooreſt of all, there needs only to be ſome paſture earth thrown on with the clay, and the whole becomes a good and valuable mould. But ſince the publication of theſe methods, a new practice has been introduced, and that very ſucceſsfully in ſome parts of England; this is the manuring ſandy ground with boggy earth, or that light and tough ſoil which lies in boggy ground at ſome diſtance below the ſurface, and approaches to the nature of peat.

The experiments which have been made with this, have ſucceeded variouſly in degree, according to the ſkill with which they were made; but the beſt method is this.

Dig from the wet part of a bog a quantity of this light, ſpongy, wet ſoil; and while it is moiſt and tender, mix with it ſome dry paſture earth, and a ſmall quantity of coal aſhes. Blend all well together, and ſpread it over the field.

Ploughing comes eaſy on this kind of land, therefore let it be well plowed in, and after ſowing, ſprinkle on ſome old woollen rags chopped ſmall. This is not a very dear way of dreſſing, the land it is meant to improve is cheap, and very often it ſucceeds ſo well, as to ſet it upon an equal footing with the better kinds. The effects of the bog earth is laſting, that of the rags is temporary, and ſhould be renewed after every crop.

The author to whom I believe the firſt hint of this practice was owing, ſpeaks of uſing the boggy earth alone, but where I have ſeen that tried it did not ſucceed. Indeed, uſed alone, it is inferior to clay; becauſe, though it has the ſame quality in detaining wet, which a ſandy ſoil naturally ſuffers to paſs off too quickly, it has not that fund of fertility which we find in clay, but this way it anſwers excellently.

Rags are alſo recommended alone in ſandy ſoils, but they cannot ſupply the great want of vegetable mould, or ſomething analogous to it. Neither is it practicable to get the rags in quantity enough, to be uſed as a manure of any conſequence alone, upon large pieces of ſandy ſoil. Nothing is more wanted than a ſubſtance which would anſwer this purpoſe, for the quantity of ſandy ground almoſt barren, is very great in England; and what we here propoſe promiſes to anſwer fully the purpoſe.

CHAP. X.

Of the management of a heathy ſoil.

BY a heathy ſoil we mean that kind which is uſually found on heathy and dry barren ground: the Scotch have a peculiar name for this ſoil, they call it TILL, tho' it ſeems their farmers, who are as confuſed in their names of things as ours in England, ſometimes give the ſame name to other ſoils, only becauſe they are barren.

He who recollects the brown duſty matter, which forms the upper coat of the ground on our large hilly commons, where no turff covers it, and where fern, and heath, and furze, and a few brambles make up all the growth, will know what is meant by the heathy ſoil: but for its qualities and nature we are indebted to the diſcoveries of that excellent perſon before named, who has applied ſcience to the ſervice of agriculture.

He diſcovered that in theſe ſoils, there not only is wanting the fine mould, which is the proper food of vegetables; but that they contain a kind of poiſon to all vegetable life: and by trials of the chemical kind he found this poiſonous quality to be owing to particles of iron.

The experiments by which this was made are inconteſtible. An acid would ferment with it, and acquire by that means an irony taſte: this liquor would turn black with galls: and the ſoil itſelf, when calcined, would be in a great meaſure attracted by a loadſtone. Theſe are the proofs of iron in the ſoil; and the qualities of that metal were ſhewn by as plain experiments: a ſmall quantity of ſalt of iron diſſolved in water, and mixed with vegetable mould, deſtroyed the plants which were ſown in it.

Thus we learn the two great qualities of the heathy ſoil; and by knowing truly to what the barrenneſs ſo peculiar to it is owing, we are directed in what manner to attempt the cure.

Though it be evident from the experiments of Dr. Home, that an irony matter in this quantity, is a poiſon to plants, the farmer needs not deſpair of mending it: nor is he to ſuppoſe, that in order to this, he muſt get out the iron it contains. Plants, though deſtroyed by too much of this ferrugineous matter, will plainly bear ſome portion of it. For Geoffroy and Lemery among the French, and many ſince among ourſelves, have found that all plants contain ſome iron: the aſhes of all vegetables, ſo far as has yet been tried, contain ſome particles which are attracted by the loadſtone. It is not neceſſary therefore, either to take this iron out of the ground, or to render it incapable of diſſolution in water, ſo as to be carried up into the veſſels of plants, as has been thought needful for this purpoſe; the great point is to add a due quantity of matter, which is fit for vegetation, to this dry and ferrugineous ſubſtance which is not: and nothing is equal to pond mud. This muſt not be uſed alone, for it would waſh away from the ſoil, but with a mixture of a clayey loam, it makes a manure that will remain with it, and improve it in a laſting manner.

There is ſo much of this heathy land in England, that it is a thing of great importance to amend it: and very late experiments have proved, that this, though it be difficult, is not impracticable. If we could take out the irony matter from this ſoil, that alone would not be ſufficient; for it would ſtill be in the condition of a dry looſe duſt, incapable of detaining the rains, and wholly deſtitute of the common nouriſhment of plants. Therefore, as this taking out the ferrugineous parts is neither practicable in itſelf, nor would it anſwer the purpoſe if it could be done; the method that is to be attempted is very plain: good vegetable matter muſt be added in large quantity, ſo that the irony particles, which now in a manner make up the ſoil itſelf, ſhall be but an inconſiderable part of it; and this muſt be of ſuch a kind, that it will remain in the land, and will detain water ſufficiently among it.

For this purpoſe let the practical farmer mix equal parts of pond mud and of a tough loam; that is, of an earth which conſiſts principally of yellow clay, but has ſo much ſand in it as will render it capable of mixing with the mud.

There need be but a ſmall mixture of it for this purpoſe, becauſe the heathy ſoil itſelf being looſe and hard, will aſſiſt in the union.

When the mud and loam are mixed, let the ſhrubs and fern, which grow upon the land, be torn up carefully by the roots, and carried off the ground, and burnt to aſhes; let theſe aſhes be mixed with the mud and loam, and the whole ſpread over the ground and plowed in. Let it, after this, be every year refreſhed with a ſmaller quantity of the ſame manure, and it will become and continue a rich and fertile ſoil. The price of this dreſſing is conſiderable, becauſe of the quantity; for ſo much muſt be laid on as in a manner to new make the ſoil. It is not to be conſidered or managed as the common method of laying on dung or the like manures, but as the improvement of a ſoil by marling: the quantity of which renders the firſt expence conſiderable; but the advantage very well anſwers to it, becauſe it laſts many years.

After the ſoil has been thus rendered of the nature of the better kinds, it may occaſionally admit all the other improvements. Four crops may very well be expected from it in the common method of huſbandry; but after theſe it will be ſerviceable to ſprinkle over the ground, ſoon after ſowing, a ſmall quantity of wood ſoot, and the dung of fowls mixed together, and a little rich mould added to this, to make it ſpread well upon the ground.

This will give the looſe ſoil a new fermentation and warmth; and the encreaſe in the crops, and fulneſs of the ear, will very well repay the additional expence.

It may not be improper to add on the preſent occaſion, that there is ſcarce any thing which has ſuch an immediate effect upon the grain in the ear, as this mixture of fowls dung, and ſoot. The greateſt ſucceſs is when this dreſſing is given with a light and ſparing hand, near the time of the formation of the ear upon the young ſtalks.

CHAP. XI.

Of the effects of laying up a ſoil in ridges.

WHETHER we have a ſoil to improve which has in itſelf the qualities neceſſary for a fruitful vegetation; or, whether it be one that has received the aſſiſtance of manures; nothing tends more to the improving its qualities,

lities, or bringing into action its natural or additional richneſs, than the expoſing it carefully to the air.

It is ſeen by repeated experience, that when a ſoil, which is in itſelf good, has been exhauſted by repeated crops; the turning it up to the air, for a due time, recruits it.

This is the effect of fallowing of land: but we have not the full advantage that might be obtained from that practice; becauſe it is not done in the moſt judicious manner.

This is a conſideration of great importance to the farmer, who is often obliged to depend upon fallowing, becauſe he has not dung: it is only in the neighbourhood of great towns, this can be had in abundance; and many of the beſt manures beſide depend upon the ſame accident. The very richeſt kinds are ſupplied almoſt entirely from London: and it is in a great meaſure owing to this that the Hertfordſhire farmers, and others who are within reach of the metropolis, have better crops than the reſt. What is attributed to their management, is in a great meaſure owing to their having the materials in abundance, which are neceſſary to produce them; ſhavings of horn, ſhreds of leather, rabbit clippings, and the like, cannot be had in ſufficient quantities elſewhere; nor are rags and coal ſoot to be obtained in due quantities in the country.

To theſe advantages the farmers of the neighbouring counties owe in a great meaſure their ſucceſs: and thoſe who live where ſuch artificial aſſiſtances are not to be obtained, ſhould carefully make the moſt of the natural benefits.

The air is common to all places, and it is the great repoſitory of vegetable nouriſhment. Into this are evaporated the virtues of dung and ſoot, of putrified animal and vegetable ſubſtances, and of whatever elſe is known, and doubtleſs of many things which do, they are not known to promote vegetation.

Theſe things have come originally from the earth into the air; and they are capable of giving vigour to the farmer's crops, if added to the earth again.

They come beſt when mixed with dews and rains, becauſe then they are better blended with the mould, and will remain longer in it. Therefore, the farmer's buſineſs, who places his dependance on theſe, is to put his land into a condition to receive them.

Tillage gives land this quality. The air, impregnated with every kind of fertility, may paſs for ever over a piece of ground, the ſurface of which is hardened and ſmooth without doing it the leaſt ſervice; but when the parts are broken and the ſurface is rendered looſe, theſe enriching particles enter and remain.

To this is owing the benefit of plowing fallowed lands. If they were left vacant of crops only, they would recruit themſelves very little; and in conſequence, the more they are plowed the greater is the advantage.

The farmers think this ariſes from the deſtruction of weeds, which would otherwiſe grow large upon the ground, and exhauſt it; and Mr. Tull, who has often happily, though not always exactly, applied philoſophy to tillage, ſuppoſes it to be owing merely to the breaking and dividing the particles of the ſoil.

The truth is this, weeds would exhauſt but little; but the ſoil would alſo gain little, if left ſo quiet as to admit their growth upon it: and in the ſame manner we may ſay of tillage, that it does not in itſelf give that fertility to the ground, but it puts the mould into a condition to receive it. On this let the farmer count, and he will not be diſappointed: and underſtanding what it is that gives him this advantage, let him purſue the courſe by which he will obtain it the moſt perfectly.

The oftener the ground is plowed during the time of its lying fallow, the more advantage it will receive. In this manner he may give it in four months as much fertility as it uſually receives in eight; and by a proper method of expoſure, he may obtain much more than twice the uſual advantage.

Since it is by expoſing the ſoil, in a new broken condition, to the air, that the great advantage of fallow is to be obtained; the more it is broken and the more perfectly it is expoſed, the greater in proportion will be the advantages.

Therefore, let him allow more plowing and deeper than is common for fallowed lands; and let him turn up the ſoil in higher ridges.

Experience ſhews, that the banks of ſheep-folds, though they have ſcarce any thing of the advantage of the dung and urine of the creatures, yet are rendered ſo extreamly fertile, that they ſerve as a manure for other lands. It is not to be queſtioned, but they receive ſome benefit from the effluvia of the creatures, but the great advantage is from the mould of which they conſiſt, being expoſed ſo openly to the air in a high ridge, and with but little thickneſs.

Something of the ſame nature we may learn from the common condition of ditch-banks about London, which are fertile in a ſurprizing degree of weeds, though they are made up of the very worſt part of the ſoil; nothing being employed for that purpoſe but the digging of the ditches, which being carried down two or three foot below the ſurface, generally afford not vegetable mould for the moſt part, but a loam or brick earth. This is not fertile in itſelf, and it can poſſibly have no advantage but from being thus expoſed; and yet the conſequence is even a ſurprizing fertility. There cannot be a greater proof of the abſolute effect of the air upon land, when properly expoſed to its influence.

We do not expect the farmer to lay up a whole field that he fallows, in banks like theſe: but as he ſees the greateſt advantage is to be obtained by throwing up the ſoil in high and narrow ridges; let him in all his plowings of fallow land, underſtand that the higher he throws up the ridges, the more benefit the earth will receive from the air; and that the next article of improvement under this circumſtance, is the frequent repetition of the work. It will be worth ſome additional trouble to obtain ſo much larger advantage; and by due attention to this care, the want of manures will, in many ſoils, be ſcarce perceived. The means of the benefit are the rains and dews; and thoſe who fancy theſe to be plain water and nothing more, are vaſtly miſtaken. Dews are raiſed from the earth, and from all things which contain a moiſture, that the warmth of the air can exhale; the perſpiration of plants is now well known, and that of animals is an everlaſting ſupply: both theſe come into the air and mix with dew, and therefore it is capable of giving vaſt fertility to land. Rain water has, in ſome degree, the ſame advantages, for it has been raiſed in vapours; and howſoever pure it may be ſuppoſed by thoſe unaccuſtomed to minute reſearches, the chymiſt knows it contains particles of many kinds, beſide the water. Theſe two kinds of moiſture, when they fall upon a hardened ſurface, do not penetrate, and when upon a ſoil that is naturally looſe, they run through. It is the ground mellowed by culture, which receives their true benefit. In that the particles are ſeparated enough from one another to give paſſage to the water, and they are ſo looſe on their own ſurfaces, that it is alſo admitted into them as well as between them; and in conſequence of this it mellows and ferments the ſoil more and more.

The earth in which plants are to grow, conſiſts of innumerable ſuch particles, and the more of them are thus impregnated, the better it will produce.

As this fœcundity is owing to the air, it will be obtained only in thoſe parts of a field thus prepared to receive it, as are expoſed to the air. We do not mean by this, that the air, rains, and dews affect in this manner only the ſurface of the earth: they really penetrate in this effectual manner to ſome depth; and the ſuperficial part ſo far is enriched; but no deeper: therefore in order to give a land the full advantage of fallowing, or in other words, to enrich it as much as poſſible by rains, dews, and air, it muſt be often and thoroughly turned.

We will ſuppoſe a field laid up in high ridges, as has been here directed, and thus impregnated with all the virtues of the air. When it has lain long enough for this advantage, the period of which muſt be varied, according to the ſeaſon and weather, theſe ridges muſt be all broke down, and new ones thrown up in ſuch a manner, that the part of the ſoil which was before in the middle of thoſe ridges, and was therefore hidden from the air, ſhall be now the outſide of the new ones, and conſequently ſhall be fully expoſed to it.

This proceſs is to be repeated, till the whole ſoil has at one time or other been turned open and free to the air, and has lain expoſed to it as long as was needful, for obtaining this fertility.

The huſbandman needs not to fear, that while he is giving this advantage to one part of the mould, he is loſing it in another; or that the part which was enriched by being expoſed to the air, will loſe that quality again, by being buried: the fœcundity the mould thus receives, is too ſubſtantial for ſuch loſs. It will never evaporate, nor any way be loſt, but in the nouriſhment of plants. Let him take care he does not permit weeds to grow upon the place to exhauſt it; and it will remain to enrich his crop.

Fallowing has this other advantage for the farmer, that it is beſt done when the ground may be left at reſt without loſs. In ſummer, which is the time for his annual crop, it would receive leaſt benefit, becauſe thoſe particles which ſhould be received into, and detained in the ſoil, are then in a great meaſure diſſipated in the air: it is in winter, and in ſpring, the great benefit of fallowing is to be obtained; and he who has not tried the rational practice here laid down, cannot conceive what may be done by mere fallows, between the time of gathering in a crop in autumn, and the ſeaſon of ſowing another in ſpring.

They err who adviſe tillage in the place of manure, or would have the farmer depend upon manure, without due tillage; the true method is to make a judicious uſe of both: and in the caſe we have named, all ſhould be left to the effects of fallowing, till the ſeed is in the ground, and then a light ſprinkling of ſome of thoſe rich manures, which operate in a ſmall quantity, is of prodigious advantage. The ſoil is looſe and open, ſo that it is readily received, and penetrates deep. It is a ſeaſon when rains are to be expected, and they waſh it in; and this is done juſt as the ſeed is ſwelling and ſoftening in the ground, and as the new roots are ſhooting from it: the moſt perfect virtue of the manure is received into the firſt rudiment of the plant, and the original ſhoot being ſtrong, the whole ſucceeding growth will be ſtrong alſo. The ſoil is free as well as rich, and the fibres of the roots are ſent every way, and wherever they diſperſe themſelves, they are lodged among nouriſhment.

CHAP. XII.

Of the effect of the winter ſeaſon upon vegetable mould.

WE have obſerved that the winter and ſpring are the ſeaſons wherein the earth receives moſt benefit from fallows, and the fact has been acknowledged by thoſe who differed moſt as to its cauſe: it has been a cuſtom to talk of nitre in the air, as a great efficient in fertilizing the ground; and the winter air has been ſuppoſed to abound with this uſeful ſalt, more than that of ſummer: froſts have been attributed to it; and conſequently, that fruitful quality which the earth is found to receive from a winter expoſure to the air, has been attributed in a great meaſure to it. But we may find more natural cauſes; and it is neceſſary we ſhould underſtand the true ones, in order to take advantage of them, by managing our culture of the ground accordingly.

If it were true, that the air in froſty ſeaſons thus abound-

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ed with nitre; that would be a reaſon why it ſhould hurt, inſtead of improving the ſoil, for nitre in a large quantity appears to be as much a poiſon to plants, as iron.

Indeed froſt is produced without the aſſiſtance of nitre; and it effects the good purpoſe of fertilizing the ground merely as froſt; not as operating by means of that ſalt.

Whatever breaks the body of the mould, gives it the means of receiving impregnation from the air; and froſt does this in a very apparent manner. It immediately connects and combines the particles of earth by means of the water that is among them; and when it ceaſes, they ſeparate and moulder away from one another. This expoſes them to the air with new ſurfaces; and whatever does that, obtains the advantage of a new impregnation. It is for this reaſon froſts, which immediately follow rain, do moſt good to the ſoil; and the farmer, who knows this, ſhould take the advantage in its full extent, by plowing up his fallows at thoſe ſeaſons when rains and ſucceeding froſts may be moſt naturally expected.

Snow has been by many ſuppoſed to fertilize the ground, on the ſame principles; but it is an equal error. That ſnow has this effect is evident; every plowman, as well as every gardener, knows it; and theſe untaught obſervers reaſon better when they ſay, that ſnow mellows the ground by lying upon it, than the philoſopher who has recourſe to his nitrous ſalt, or the chemiſt with his nitro-aerial principles. Of late a new ſyſtem of the fertility derived from ſnow is eſtabliſhed; and as there is ſome miſtake in it, we are ſorry to ſay it is the thought of Dr. Home, who is in other particulars ſo juſt a reaſoner.

The ſyſtem is, that ſnow contains an oil, and by that means gives fertility to the earth. The proof is, that ſnow water being ſet a fortnight in a cellar, became covered with a mouldineſs, and that this mouldineſs burnt on a red hot iron: we ſhall not deny that mouldineſs contains oil; all vegetables do ſo, and mouldineſs is of that tribe. But this oil neither ever was in the ſnow, nor is dependant on it.

We have of late time arrrived at a great degree of knowledge in the minute part of the creation: mouldineſs is known to conſiſt of ſmall plants, whoſe ſeeds floating in the air, take root on the ſurface of fluids. This is all: theſe ſmall plants would have contained their portions of oil, whether they had grown on ſnow water, or on common water; and the ſnow would have afforded no oil without them.

The ſame accurate examiner allows that ſnow contains no ſalt; and we are therefore left to the plain old ſyſtem, of its mellowing the ground; and its moiſtening it in a peculiar gradual way, by its ſlow melting, for the effect it has in fertilizing the ſoil.

CHAP. XIII.

Of the overflowings of lands.

THE farmer dreads his land being overflowed at an improper ſeaſon; but when he can obtain it at a right time, there is nothing he ought more to wiſh. We ſpeak here of the plain and ſimple overflowings of a common water loaded with light and fine particles of mould, ſuch as floods naturally bring with them: but there are waters whoſe quality is as hurtful as this can be beneficial.

When violent rains, running from a ſomewhat higher country into rivers ſwell them beyond their banks, and the lands upon a level, a little above their natural ſurface, are overflowed, there is the natural addition of a moſt rich and excellent manure, and it is ſpread in a manner art could not effect.

Theſe rains waſh out of the plowed lands of the higher country the richeſt part of the manures, and the lighteſt and fineſt of the ſoil. They run thick with theſe into the rivers, and they are in the ſame condition carried over their banks to the adjoining grounds: thus the richeſt part of dreſſings, mixt with the moſt valuable portion of the natural earth, is ſpread in a thin coat over the ſurface of the ground. The flood remains long enough for the thick parts in the water to ſubſide, and the abundant wet is thoroughly diſcharged, either by the natural deſcent of the ground, or with the aſſiſtance of a few drains; and all is left that could be wiſhed, and nothing beſide.

CHAP. XIV.

Of waters hurtful to vegetation.

SUCH is the effect of thoſe favourable overflowings; but where water impregnated with ingredients which are enemies to vegetation, or even with thoſe which in a ſmall proportion would help it, in an over abundant degree, the damage is as great as the benefit in the other caſe: and when the impregnation of the water is extreamly ſtrong, often it exceeds in miſchief all the other could effect of good.

The farmer ſees what he ſhould ſeek in overflowings: we ſhall now tell him what he is to avoid. A warm muddy water is what he ſhould deſire, and on the contrary, ſuch as is clear and cold will do great damage. The water of rivers in flood is the beſt, and the water of a cold ſpring in its clear, pure ſtate, can do nothing but miſchief.

Even if it ſhould come over the ground when the crop wanted watering, it would not anſwer that purpoſe without greater miſchief; gardeners know the water given to plants ſhould be of the ſame temperature with the ſoil on which it is ſprinkled. If it be cold, it does more harm by chilling the roots, than good by affording moiſture. A field is only a great garden; and he will manage it beſt who beſt underſtands the garden culture.

Beſide the hardneſs and coldneſs thus found in abſolute water, there may be much worſe ingredients. Springs are medicinally impregnated with ſalts and metals; and in this caſe their water is very improper for the ſervice of vegetation. When this is the caſe in a great degree, the waters are reſerved for uſeful purpoſes; but it very often happens, that ſprings are impregnated with theſe in a lighter manner: it is not perceived or regarded in the taſte; but it may be enough to hurt vegetation.

In theſe caſes, where a ſpring riſes on the land of a farmer, his great care muſt be to conduct it off; and where it runs elſewhere near him, he muſt prevent its getting into his ground.

We have ſhewn that iron is hurtful to vegetation, when the quantity is abundant in the ground; and irony waters are in England very common. The huſbandman cannot be too much upon his guard againſt theſe. Springs are often ſo ſituated as to influence the ground to a great diſtance: without making bogs, they will from like cauſes moiſten the coat of vegetable mould a great way, and ſo far as their influence extends, no manure or other art can produce good crops.

When the farmer ſuſpects this, let him try the water with galls, or even with green tea: the method is eaſy, and the proof is abſolute. If the liquor become purple or black, there is iron in the water. And till he has dug a free paſſage for it below the level of the coat of mould, he muſt expect no fertility in the ground.

Salt ſprings have the ſame quality: for though a little ſea ſalt or ſea water are excellent as manures, too large a quantity is always deſtructive to vegetation.

Waters impregnated with the principles of ſulphur, are alſo hurtful, in a great degree, to vegetation; and when it happens that veins of coal are ſo diſpoſed, that water can be impregnated by them, and afterwards can run upon the farmer's land, the damage is equal to that ariſing from any of the other.

Theſe obſervations reſpect particular caſes, but they may be extreamly uſeful: there are ferrugineous ſprings common on high lands; and in their courſe they are often detained by the particular conſtruction of the ground, where they do great and unſeen miſchief. Many a piece of land in this kingdom, which has been neglected by the common farmers, and has foiled the attempts of the moſt artful in the common methods, may be rendered as good as any in the neighbouring country by digging a ſingle drain to carry off thoſe poiſonous waters.

CHAP. XV.

Of earths hurtful to vegetation.

WE enter here on a new article in huſbandry, but it is of the higheſt importance to the farmer in many particular inſtances: as there are waters hurtful to the growth of plants, ſo there are earthy and other ſolid ſubſtances found in digging, which are hurtful for the ſame reaſon, and at leaſt in an equal degree.

This depends on a plain cauſe, for earths and other ſuch ſubſtances may be, and are often impregnated as ſtrongly with theſe qualities as water.

The farmer is in many caſes adviſed to uſe clay as a manure upon his ſandy lands. Let him take care that he uſe for this purpoſe the white, yellow, or brown clay, avoiding the blue and black, unleſs neceſſity urges him to take them; and then never meddling with them except he has firſt carefully examined them.

All the blue clay about London is full of lumps of *pyrites* of ſhells filled with this ſubſtance, of pieces of wood whoſe pores are filled with it; and of glittering, looſe, little particles of it.

This would be moſt unfit to lay upon land as a manure. We have found that iron and ſulphur are poiſon to plants, and this pyrites is compoſed of theſe two ſubſtances. The farmer will know it by its ſhining, and wherever he finds it, he muſt be careful to keep it out of his ground.

Even in the other coloured clays, which are commonly uſed for this purpoſe, lumps of this matter are often found; and there cannot be too much care uſed in picking them out of ſuch as is intended for manure.

It is the quality of theſe lumps of the pyrites, that they will lie buried in the earth ever ſo long without breaking, or diſſolving; but when they are expoſed to the air, they in a few months crack and fall to powder; this powder taſtes like copperas, and is indeed full of that irony ſalt. The rains diſſolve this, and its influence is ſpread as far as that moiſture reaches.

Not far from Thorndon in Eſſex, the ſeat of the late excellent lord Petre, I ſaw a field of corn in general in good condition; but here and there were ſpots in which the crop was utterly withered. There were ſo many of theſe, that they greatly reduced the value of the crop. We ſpoke with the farmer, who contented himſelf with ſaying it was a blaſt: but we ſhewed him the cauſe. The field had been dreſſed with what he underſtood to be a yellow marle: it was really a looſe and ſomewhat loamy clay; and with this had been thrown on many of theſe vitriolick lumps, which as they were not large, he had not been at the trouble to remove. I ſhewed him the remains of theſe in every ſpot where the corn was thus blaſted, and on taſting the ground, he was ſenſible of an inky flavour. According to the bigneſs of the lump, this miſchief had extended to two, three, or four foot diameter. The man was ſenſible of his error; and his loſs may ſerve as a caution to others.

Beſide clay impregnated with pyrites, and the maſſes of pyrites itſelf, there are other ſubſtances which contain iron, and may therefore be hurtful to vegetation; if they are originally in the ground, or are by any accident brought into it. Ochre is a ſubſtance very well known in England, and however valuable in itſelf, it may be very detrimental to the farmer if it comes upon his land where valuable crops are to grow. This alſo is a clayey ſubſtance highly impregnated with iron; and as it will break to pieces in the air, the influence of that pernicious mineral would extend itſelf over the ground.

The fineſt ochre is found in lumps, and diſcovers itſelf by its bright yellow colour; but we ſometimes find whole beds of a coarſer kind, not unlike the brighteſt of the yellow clays: this is impregnated with iron, though in a ſmaller degree; and if this ſhould by any careleſs huſbandman be miſtaken for a common clay, and uſed as a manure, the conſequences muſt be very deſtructive. We do not mean by this, that any earth which is impregnated with particles of iron, is thus fatal to vegetation; for all clay contains ſome little portion of it. The miſchief depends upon its being in large quantity; and in a ſtate of eaſy ſeparation; and this is the condition of iron in the ochres, and of the vitriolick ſalt in the lumps of the pyrites lodged in beds of clay.

Beſide theſe there is yet an earthy ſubſtance to be named, into the uſe of which the farmer may be eaſily deluded; and which is very deſtructive. It is a blackiſh, brittle, earthy matter, found above and between beds of coal, and ſometimes in a thin ſtratum lying over beds of clay and of marle. There are black marles, as well as thoſe of other colours; and the farmer may eaſily be led into the miſtake of uſing this black, brittle earth, as one of them.

This would be very miſchievous in the effect, for it is an earth loaded with iron.

The miſtake has been ſometimes made, and the conſequences has been not only the deſtruction of the preſent crop, but the debaſing of the land for many years. This earth is a looſe clay, full of minute and half diſſolved particles of the pyrites before mentioned. When this is laid on a field by way of manure, the quantity is very great, and the whole body of the ſalt is waſhed in before the miſchief is diſcovered. Dr. Home mentions inſtances of his own knowledge of pieces of ground remaining utterly barren for three years, after ſuch an earth was laid upon them; and gives the teſtimony of others of its having contained the miſchievous effect much longer. This ſagacious examiner into the nature of theſe ſubſtances, found that the miſchief was owing to iron; and indeed, the taſte of the earth, after it has lain a little time expoſed to the air, very plainly declares as much.

The huſbandman will know this by its taſte, and by its crumbly and rough ſurface; but he will be led early into a ſuſpicion of it, by the manner in which it lies in the earth.

Marle uſually forms vaſt beds or thick ſtrata, and there lies compact and firm, however brittle it be when taken up; whereas this poiſonous ſubſtance lies only in thin looſe veins upon or between other beds of other matter. Theſe marks will ſhew it, and they ſhould be underſtood as moſt important directions to the huſbandman, to avoid what would be more deſtructive than all the common accidents attending on his crops put together.

CHAP. XVII.

Of the conſtruction of dunghills.

AS mean a ſubject as this may appear to the generality of readers, the farmer is deeply intereſted in it: to him it is of more importance than almoſt any thing; and it is for that reaſon, that while we wonder at the artleſs method in which theſe heaps of manure are generally made up, we ſhall endeavour to give directions whereby thoſe faults may be remedied.

The intent of a dunghill is to preſerve ſuch materials, as may be uſeful for manure, till they are wanted upon the ground; and to encreaſe their virtue by fermentation, while they lie together. What is underſtood by common dung, is ſtraw wetted with the urine, and mixed with the excrement of horſes. The ſtraw, which is a vegetable ſtalk, becomes by degrees, a very rich part of the manure; the animal matter promoting a fermentation in it, which reduces the dry ſubſtance of it into a ſoft and mellow pulp, which by degrees diſſolves as it were with the rains, and is waſhed into the ground, and becomes the food of a new plant.

In this manner all vegetables will rot, and in that ſtate they will furniſh a ſupply of nouriſhment for others. Therefore all waſte matter of this kind ſhould be mixed with the dung in theſe heaps, and rot among it.

We have given the method of making a pit for a compoſt of all refuſe, in a preceding part of this work; and we ſhall now treat of the management of thoſe quantities which are expoſed in heaps upon the ſurface of the ground.

A great article in the rotting, fermentation, and due preparation of dung, is the keeping it in a middle ſtate of moiſture. Thoſe who make pits, uſually keep it too wet; and in the common method in dunghills it is too dry. The beſt way is to open a large but ſhallow pit in the ground, where the dunghill is intended to be raiſed, and to clay the bottom of this, unleſs it be in a ſoil which will naturally hold water: but that too much wet may not be, there ſhould be drains from this, and the liquor running from them ſhould be preſerved. In this is contained a great deal of the virtue of the ingredients; and it ſhould be returned to them again at proper times. When rains keep the heap moiſt enough, this may ſtand in the pit into which it runs; and in dry ſeaſons, when the upper part of the dunghil is crumbly, it ſhould be thrown upon the ſurface again at different times, by a labourer, with a ſcoop. By means of that repeated and gradual wetting, which would ſupply the place of rains in ſeaſons where none fell, the maſs would be kept at all times in a due condition of moiſture. This wetting with its own liquor would be alſo in many reſpects preferable to that by rains, for the moiſture itſelf having been tinctured with the fermented materials, would the more and better aſſiſt fermentation.

They place their dunghills much amiſs, who lay them on the tops of hills, or in bottoms. In the one caſe, the winds dry them too much on the ſurface; and in the other, an over-abundance of wet chills and ſtops the fermentation, as well as deſtroys the conſiſtence, and waſhes away the beſt parts.

The proper method is, to fix upon a place which has a very ſmall deſcent: and a little below the dunghil, to make one or more of thoſe pits, which are to receive the moiſture that drains from the maſs.

When the dunghil is large, there ſhould be ſeveral ſuch pits, becauſe the quantity of moiſture which runs off will be conſiderable; and becauſe it will be eaſier for the labourers to ſprinkle over the whole maſs from ſeveral pits in different places, than from one.

As the ſun is of little ſervice in this fermentation, it is beſt to allow it but little influence on the dunghil, becauſe it will evaporate the more ſubtile parts. Winds have the ſame effect; and therefore the dunghil ſhould no more be expoſed to one of theſe, than to the other: having choſen the proper ſpot, let the farmer plant about it trees of quick growth, and ſuch as will bear moiſture: none are ſo proper as the poplar kind. Theſe will ſhoot very quick in a ſoil kept moiſt with the impregnated water of a dunghil, and they will keep off the ſun and winds: but this is not all. The poplars evaporate a vaſt quantity of moiſture, this will hang in the air defended by their ſhade, and the dunghil will have the advantage of ſhade and warmth, and a moiſt air. Fermentation will therefore be promoted, and a miſchievous evaporation prevented; the whole maſs will mellow by degrees, and by frequent turnings will become equally and uniformly fit for vegetation. A dunghill like this will anſwer doubly the purpoſe of that which is made in the common careleſs manner; and the trouble is little more than is allowed in the uſual way.

When we direct that the dunghill ſhould be defended from the conſtant force of bleak and drying winds, we do not mean that it ſhould be hedged round, or abſolutely ſhut up from them. Let it be open to the ſouth-weſt: for the moſt benefit is found from that quarter: why it is ſo nobody can tell, but experience ſhews that it is ſo.

Every time the dunghill has been freſh turned, let a thin covering of mould be ſcattered over it; the parings of any waſte place near hand.

This aſſiſts in defending the dung from the miſchief of evaporation; and being ſprinkled over occaſionally afterwards with the drainings of the dunghill, and turned in with the next digging up of the maſs, it will not only encreaſe the quantity, but even improve the whole.

The purpoſe of dung is to give fertility to land; and we are ſenſible that it does this, by raiſing a fermentation. It will better raiſe this fermentation when there is a ſmall quantity of mould among it, than when it is mixed pure among the ſoil of the field.

Thoſe who are accuſtomed to fermentations, know that they are never brought on ſo regularly, or ſucceed ſo well, as when a part of the matter to be fermented is originally mixed with the fermenting matter. It diſpoſes the two to mix more readily; and all the power of the ferment is preſerved and employed, whereas, otherwiſe, a great deal of it might be loſt before the operation was well begun.

This is exactly the caſe in the preſent inſtance; and abſolute dung therefore does leſs ſervice, than ſuch as has an original mixture of mould with it.

Pure dung, though well mellowed in the heap, will be in a great meaſure evaporated on the ground, before its proper fermentation, by which it is to improve the ſoil, is begun; but when there is a mixture of mould with it, the operation begins immediately, and there is no time for the evaporation.

CHAP. XVIII.

Of aſſiſting the fermentation of dunghills.

WE are ſenſible that many diſagreeable ſubſtances are uſed by the farmers, immediately upon the ground when corn is ſown; and we may much better bear the thought of them in the making of dunghills, where they alter their nature by fermentation, before they are brought to the immediate ſervice. Thus old woollen rags, full of the effluvia of beggars who have worn them, are thrown immediately on the field where corn is growing; but there would be leſs coarſeneſs, in adding ſuch things to the common maſs in dunghills.

This apology is neceſſary for what we are about to propoſe; which is aſſiſting the fermentation of theſe repoſitories of manure, by putrifying animal carcaſſes.

Experiments have proved, that the degree of putrefaction and fermentation is much greater in the fleſh of animal bodies, than in their excrements; and on this principle is founded the method here to be propoſed, of aſſiſting the fermentation of dunghills.

Half the effect of this manure is loſt to the farmer, by the ſingle accident of its being generally but half fermented when laid upon the ground. Perfect fermentation would mellow all the parts; and they would then and no otherwiſe be all uſeful to the purpoſe of vegetation. This will be promoted extreamly, by adding, at a proper time, the fleſh of putrifying animals. It will loſe its particular nature in the general maſs, and will have no particular effect upon the corn, more than a very perfect enriching of the ſoil.

Thus when the dunghill is made up, and has lain ſo long as to require its firſt turning, let there be buried in it, at about the third part of its depth, the carcaſſes of two or three dead dogs, or ſome other matter of like kind; and let a coat of mould be thrown over the top of the dunghill; when it is made up again with this addition, the firſt effect of high fermentation is over, by the time of its firſt turning; but the matter is by no means in a ſtate not to require more. The effect of theſe buried animal ſubſtances is to excite anew this fermentation; and from their laſting putrefaction, it will continue and encreaſe in the very body of the maſs for a long time. A month after making up the heap in this manner, let there be a good ſprinkling given to the ſurface, with that rich liquor which has drained from the heap. This will continue the fermentation when it was beginning to flag; and this ſhould afterwards be repeated once in a fortnight, but in a ſlighter manner, unleſs accidental rains render it unneceſſary.

When upon repeating the turning the dung it is found to be mellow, and of a regular conſiſtence throughout, it ſhould be immediately uſed, where there is occaſion for it: for longer keeping is to its diſadvantage. There is a ſtate wherein all things are the moſt perfect in their kind; and then they ſhould be employed, for nothing continues in it long.

The manner of uſing the dung muſt be in ſome degree different, according to the ſeaſon of the year; for the ſame practice that is good in winter, will be bad in ſummer; for at one of theſe ſeaſons the dung would be receiving benefit by the air, as it lay on the ground: and of the other it would ſuffer extreamly, by evaporation from the ſun.

CHAP. XIX.

Of the manner of laying dung upon the ground.

THE farmer who will attend to the leaſt articles which concern his profeſſion, will find great advantage in his profits. Things are carried on in all buſineſſes in too mechanical a manner, and in none ſo much as this. When the ground is ready, the dung is carried to it whether it be fit for uſe or not; and the ſame method is uſed on moſt like occaſions.

In winter dung will loſe little or nothing by evaporation; and on the other hand, it will gain a great deal of advantage by lying open to the froſt, ſnow, cold rains, and dews: and in conſequence it is beſt to lay it on ſome time before the ground is to be wrought for plowing it in; on the contrary, in ſummer it gains little from the air, and loſes a great deal by evaporation; and therefore the ſooner it is covered, the better.

On this principle let the farmer conduct himſelf in the uſe of dung on plowed lands. In the cold months let him plow up the ground juſt before laying on the dung, and then let it lie a conſiderable time. The rains will waſh out a part of its virtue, and this will be freely received by the new tilled land. At the ſame time, it will be alſo receiving continually new virtue from the ſeaſons; and by degrees more and more of its ſubſtance will be waſhed into the ſoil, as more and more of it becomes capable of diſſolution by the power of the air; till at length the maſs is to be buried by another tillage.

On the other hand, when dung is to be laid on in hotter weather, let it be brought into the field juſt before the plowing; let this be done only from the time of day-break, till an hour before noon, that it may not be expoſed to more ſun than it need; and let it be plowed in as it is brought on. No more being thrown upon the ground, than can be wrought in that day.

CHAP. XX.

Of more ſingular manures.

WE learn from repeated experience, that all vegetable and animal ſubſtances, when they come to a ſtate of decay, ſerve for fertilizing the ground: but though theſe are a very numerous claſs of bodies, they are not all that may be called in to the aſſiſtance of the farmer. Salts, which are of mineral origin, and various other ſubſtances, have been tried; and the reſult of theſe experiments cannot be made known too univerſally.

Virgin earth, that is, ſuch as has had no growth upon it, not only is very fertile in itſelf, but it will give fertility to other ground: the more, if it have ſtood for a conſiderable time expoſed to the air.

Thus a bank of common mould, which has ſtood a year or more expoſed eaſt and weſt, will contain ſo much vegetative matter, that it will act as a manure upon twenty times its quantity of common ſoil.

This is a kind of manure which farmers ſhould ſeek after more diligently than they do: it is often to be had where it is perfectly neglected; and might be obtained in any quantity at pleaſure. It fertilizes the ſoil without giving any rankneſs to the growth; and is, perhaps, of all others, the manure beſt adapted to paſturage.

Acid liquors promote vegetation, if not too ſtrongly ſo; even the corroſive kinds, when diluted with a ſufficient quantity of water, have this effect. We have inſtances not far from London, where corroſive acid liquors are made, and where the refuſe and waſte matter is thrown about at ſome diſtance: I have obſerved the conſequences, and find conſtantly that where the quantity is great, every thing is burnt up by it; but where leſs is thrown, the plants which nature has ſcattered over the ground, thrive in a moſt ſurpriſing manner.

I have obſerved alſo, that when a quantity has been thrown out, that would have done miſchief to the plants in a natural ſtate, rains having come on, it has been rendered beneficial.

This is a thing worth careful notice. The quantity of acid liquors made in London for the uſe of dyers, and the workers in metals, is very great; and the refuſe of theſe is a manure of the more conſequence, becauſe a very little of it goes a great way.

There are many natural reaſons why this effect ſhould be produced by theſe ſubſtances. We know the earth abounds with alcaline principles; on theſe acids work, occaſioning firſt a fermentation, the uſe of which to vegetation is very well known, and afterwards producing a neutral ſalt. The benefits of this are enough known alſo.

But beſide all this, theſe liquors give abſolute warmth to the ground. We know that any of theſe acids being mixed with common water, produces heat: water is never wanting in the ground, and conſequently there muſt be a proportional warmth produced. Thus, by this unregarded and hitherto unknown manure, the greateſt conſequences are to be expected together; fermentation, and warmth in the ſoil, and the production of a neutral ſalt moſt favourable to vegetation.

The uſe of acids, and even the ſtrongeſt kinds, has been found by experiments meant to produce effects actually contrary. Dr. Home, whoſe veracity is as unqueſtionable as his judgment, relates an inſtance of a gentleman who poured oil of vitriol on ſome rank graſs in his court, which he wanted to deſtroy: and on the contrary, the graſs grew ſtronger than before.

I wiſh he had given more particulars. Doubtleſs this powerful acid did deſtroy the plants on which it fell; but graſs is hardy, and will grow from the ſmalleſt pieces of the root. Rains might fall, and diluting this rank acid, convert it into a rich manure, from which, the rank growth following proceeded; the ſame liquor which had deſtroyed part of the roots, aſſiſting the growth of the reſt.

Another natural circumſtance might alſo favour this, and abſolutely convert the acid to a fertilizing ſubſtance upon the ſpot. Court-yards are often paved with flat ſtones, and moſt probably this was the caſe in the preſent inſtance; for it is more likely a perſon ſhould uſe ſo coſtly a liquor to deſtroy graſs, which grew up in the ſmall cracks between ſuch ſtones, than ſuch as ſpread itſelf more at large. In this caſe the acid might loſe its force as a deſtroyer, and become a fertilizer on the ſpot.—The ſame author found, that vitriolated tartar was an excellent ſtrengthener of the growth of plants: and vitriolated tartar is no other than this acid of vitriol, reduced by the alkali of tartar to a neutral ſalt. The flat ſtones uſed in paving are generally of the alkaline kinds, and they are as capable as the tartar itſelf, to convert the oil of vitriol into a neutral ſalt. Therefore, very probably, this was the ſtate of the caſe. Oil of vitriol, which in its own ſtate could not but have deſtroyed all vegetables, became, by its effect upon the ſtones, neutral, and a great fertilizer.

The practical uſe of this is evident. We learn firſt, that thoſe ſoils will receive moſt benefit from acid manures, which themſelves contain a great quantity of alkaline matter. Such are the limeſtone grounds and chalky lands; and for others, probably, the true way to advantage will be to mix the acid manure with an alkaline matter.

Theſe ſubſtances are ſo common, and ſo cheap, that no difficulty can be ſtarted on that account. Chalk, limeſtone, and that kind of ſea-grit which conſiſts of broken ſhells, are all of this ſort: but perhaps the greateſt thing of all is behind. Marle is alkaline, and poſſibly an inconceivable improvement may be made by mixing this with the acid refuſe of thoſe wholeſale chemiſts, who make ſpirit of nitre, aqua fortis, aqua regia, and oil of vitriol, or ſulphur.

The quantity of marle required for the fertilizing of land is the greateſt inconvenience in its uſe; and not improbably the mixing with that alkaline ſubſtance, a ſmall portion only of this acid, a leſs quantity may anſwer the ſame purpoſe.

Let the practical farmer diſtinguiſh carefully between what we propoſe, and what we abſolutely recommend: it is the difference between theory and practice. This is probable; and it will be well worth while to make the trial, becauſe if it anſwer, the advantage will be very great: but there is a great deal of difference between what we know, and what we think: for in the latter we may be miſtaken; in the former we cannot. We give theſe cautions plainly; for he would act on very different principles from ours, who ſhould induce the huſbandman to dangerous experiments, to pleaſe his own imaginations.

CHAP. XXI.

Of the uncertainty of philoſophical reaſoning in agriculture.

THE caution we have given the farmer to diſtinguiſh between facts and conjectures, ſhould be extended to all writings on the ſubject of agriculture; for we are never ſo often or ſo widely deceived, as when we take for granted all that appears probable from our own reaſonings.

No theory was ever more generally eſtabliſhed, than that ſalts and oils are the things which give fertility; and of all ſalts nitre has been called the moſt capable of giving it: but the experiments of the author lately mentioned, ſeem to ſhew that all this fine reaſoning is either erroneous, or at leaſt, that it cannot be reduced to practice.

Oil of olives, the moſt innocent of any, in the ſmall quantity of one ounce to ſix pounds of earth proved very hurtful; and ſalt-petre in the ſame quantity alſo rather hurt than aſſiſted vegetation. But ſmall as this quantity might appear to the experimenter, it was plainly too much, for ſea ſalt in the ſame proportion was found alſo hurtful. In this caſe the quantity alone could be the cauſe of the miſchief, for there is nothing in huſbandry more certain, than that the uſe of ſea ſalt as a manure is highly ſerviceable.

Upon the trials which have been made of the moſt powerful acids and alkalies, the preference ſeems due to the acid tribe. What we have mentioned as practically known of the acid of vitriol, is recorded alſo of the acid of nitre in experiments, that it promoted vegetation: whereas the ſpirit of hartſhorn impeded it; and ſeemed indeed one of the poiſons of vegetation. What has been found on the making experiments with ſpirit of nitre, favours the opinion before given, of the circumſtance of oil of vitriol making graſs grow ſtrong; for at firſt the nitre ſeemed to deſtroy the principles of vegetation, but in the end it favoured them; that is, when juſt uſed it was too ſtrong, but when blended with the moiſture of the ground, it was brought down to a condition of ſervice.

Brimſtone has been found alſo deſtructive of plants, tho' at firſt it ſeemed to promote their growth.

Epſom ſalt appears to promote the growth of plants. A ſalt of this nature might be obtained cheap enough, for a ſmall quantity ſerves for a great deal of ground.

Theſe are the principal things which have been tried upon the ſubject; and it muſt be owned, that the reſults of repeated experiments have often contradicted one another; and the concluſions ſeem very equivocal. This lets down the importance of philoſophy in the affairs of common life: but it is a truth, and muſt be owned. In the mean time, if the experiments of this ſort have not all the authority that might be wiſhed; it muſt not be denied that they have their uſe. The farmers employ all theſe ſubſtances in one or other of their liquors for the ſteeping of ſeed corn: and it is fit they ſhould know which of them, upon theſe trials, have been found abſolutely to hurt vegetation. The great caution on this head is againſt two of the ingredients, theſe are copperas and brimſtone. We read many receipts in which theſe are uſed for the ſteeping of ſeed corn; and we ſee, by theſe experiments, that it muſt be a wrong practice, for that both of them are poiſons to plants. The brimſtone is the moſt dangerous of theſe, becauſe the effect of it may be eaſily miſtaken: it appears at firſt to aſſiſt the growth of thoſe plants, which it afterwards deſtroys.

CHAP. XXII.

Of the effects of manures on different ſoils.

THE great requiſite in a ſoil in point of conſiſtence, is that it be firm enough to hold the plant upright; and yet open enough to give free paſſage to the roots. We meet with ſoils which are faulty in the two reſpects, of heavineſs and lightneſs, or cloſeneſs and openneſs; but the latter, in a degree to be hurtful, are not nearly ſo common as the others; nor are they ſo difficultly to be remedied. The farmer has been told in the preceding parts of this work, that he is to bring theſe ſoils to good, by adding firm and ſtiff ingredients, clay to ſandy ſoils, or clay and paſture earth to abſolute ſand, and ſo of the reſt.

If he neglect this, and think to improve all ground by the ſame methods, he will deceive himſelf extreamly. Dung, which is the common, and one might almoſt ſay, the univerſal manure, does no good upon many of the extreamly light ſoils; and even tillage, on gravelly land, does miſchief when obſtinately repeated.

They ſeem to carry the point too far, who affirm that a very light ſoil will produce a better crop without dung than with; but if it be true that it will produce but very little the more for it, the diſadvantage is ſufficient, becauſe the price of the dreſſing is loſt.

Thus much probably is true, for the dung is either burnt up through the open ſurface of ſuch a piece of land in dry weather, or waſhed away through its porous ſubſtance in wet: ſo that in neither caſe it remains with the roots, nor in a place where it can be uſeful to the plants.

If it be plain that manure is thrown away upon ſuch ſoils, it is equally evident that a great deal of tillage ſucceeds no better on the gravelly, till they have been properly mended. Theſe ſoils conſiſt of round pebbles, and a little mould. The virtue is in the mould alone, and the plowing mixes it with the pebbles, but the next rains waſh it in great part down. If the plowing be frequently repeated, this rich part of the ſoil is repeatedly waſhed away in that manner, and the crop has only ſtraws to grow in.

Thus the very management of ſoils differs, and muſt differ according to their nature; much more the additions for giving them fertility.

Clays cannot be plowed too often; but the times at which they receive moſt benefit, are in the heat of ſummer, and juſt before froſt. The expoſing them to the full ſun has, in ſome degree, the effect of calcination, which reduces clay to powder, and at once converts it into a fine rich ſoil. But it is juſt the contrary with thoſe looſe and open earths, whoſe better part we expoſe to be waſhed away or evaporated by theſe repeated turnings. If the richneſs of a ſoil depend upon any of the common manures, there cannot be a more deſtructive practice than that of often turning them up to the ſun and air: for inſtead of receiving any of the expected good, they will loſe vaſtly more.

CHAP. XXIII.

Of manuring clay grounds with marle.

WE have obſerved, that the farmers are taught from father to ſon, that marle is not a proper manure for clay. It is even among their proverbial rhimes. But we have ſhewn that reaſon contradicts the abſolute aſſertion of this proverb; and we are proud to acquaint the huſbandman, that experience has confirmed that ſome kinds of marle may be very uſefully applied to clay grounds, both in our own and in a neighbouring nation. The experiments of Dr. Home teſtify in little what is thus ſupported by fair experience in larger trials; and there is ſo far an advance made toward uſeful truth, that we have diſcovered an important error.

Let the Engliſh farmer therefore know, that marle is an excellent manure for a clayey ſoil, provided he chuſe a proper kind. There are clayey marles, ſandy marles, and ſhelly marles; of theſe the two laſt alone are proper for heavy and ſtiff ſoils, the other is peculiarly appropriated to light poor earths,and it exceeds any thing in improving them. The reſult of the Scotch experiments proves, that marle and dung are fine manures for clay; but we muſt add, that unleſs clay be firſt broke by a mixture of ſome other matter, as ſand or the like, dung can be of little uſe to it: for the ſun will evaporate its virtue, or rains will waſh it off, as it cannot penetrate the ſubſtance of that tough ſoil in its natural ſtate.

It is here impoſſible to paſs over one remark on the experiments made by Dr. Home on clay. He concludes from theſe, that ſand is the worſt manure of all others for clay. I ſhall not queſtion the truth of his experiment, for his character is much above ſuch doubt; but the concluſion he draws from it is abſolutely erroneous. What we learn from it is, that we are to pay little regard to thoſe experiments, which would lead us from what happens to a handfull of earth in a pot, to reaſon upon the ſurface of a field: ſand mixed with clay in a garden-pot produced the worſt plants of all the experiments, in the others, of which lime, dung, marle, and the like were uſed: but ſand mixed with a clayey ſoil in the fields of many of our counties in England, we have ſeen give fertility beyond all other additions. We are obliged to this author for the confirmation of the doctrine, that a well choſen marle is a good manure for clay; but we ſhould leave the farmer in the way of much more error, if we did not tell him that the difference between ſand added to clay in a pot, whoſe ſides are heated with the ſun, and through whoſe bottom no dew riſes, and in a field whoſe coat of mould is only expoſed on the ſurface, and is continually moiſtened from below, is ſo very great, that though the plants were parched up by the ſcorching ſand in the one, they will be in no danger in the other.

CHAP. XXIV.

Of the manner wherein plants are nouriſhed.

THE dews, rains, and winds we find feed the earth with the proper nouriſhment of plants: theſe are received by their roots, and thence conveyed upward ſo as to form a ſtalk, leaves, flowers and ſeeds; and theſe laſt being perfected, there is an end of the growth, both for the purpoſes of nature, and the ſervice of mankind. Nature's purpoſe is anſwered, becauſe in the ſeed there is a new principle of life; and the intent of the farmer is fulfilled, whoſe purpoſe in ſowing was the ripening of the ſeed or grain.

What it is that the rains and air give to the ground as nouriſhment, has been ſtrangely diſputed: but this is evident, that all which was vegetable matter before, is one way or other diſcharged into the air, that great receptacle of all evaporation and aſſemblage of all things. If theſe particles, which plants had drained from the earth, being thus at length evaporated into the atmoſphere, are thence delivered to the earth again, there is then only a ſucceſſion of things, and the earth receiving back what it has given, is ready to give it again.

This is a plain ſolution of what is ſeen univerſally, that all decaying vegetables become manure to vegetables; and alſo the fleſh and excrements of animals: theſe having either fed on herbs, or on others which had taken this food.

Thus the courſe of nature is a continued round, a circle which meeting with itſelf at its ſuppoſed termination, is always compleat, and always the ſame.

God created the earth in a condition to nouriſh plants, and placed the ſeeds of plants in it for growth; theſe exhauſted the ſoil. But what became of that matter they had taken from it? If they putrified upon the ſpot, they returned to the earth and air all they had received. If they were eaten by animals, ſtill the event has been the ſame: theſe animals have diſcharged a part of the vegetable matter in their excrements; and in the end all has been reſtored to the earth or air again; their bodies when dead, putrifying there: thus nothing is loſt, only the place is changed. The air receives the great part of this exhauſted nouriſhment of the earth; and the earth which is looſe and ſpungy attracts and receives it again: dews and other watery vapours entangle it; and being too heavy for being longer ſuſpended in the air, it falls and impregnates the ground afreſh.

Thus is all nature kept in her true courſe: he who beſtowed this quality upon the ground, knew in what proportion it was neceſſary, and he gave in that quantity; he allotted that courſe of things by which it ſhould be continually exhauſted and reſtored again; and thus preſerves what he created.

When the farmer has tilled and dreſſed his ſoil; that is, when he has looſened its particles, and mellowed the maſs, it becomes a kind of ſpunge to the air, imbibing its watery juices impregnated with all theſe nutritive particles, and retaining them till roots of plants receive them.

The powers of nature now very well known, convince us not only how the juices thus reſtored to the earth are received into the roots, and carried up the ſtalks of plants, but that it muſt be ſo. Wood, when out of a ſtate of growth, if dipped in water at its lower part, becomes, by the aſcent of the wet, moiſt in its upper; and we cannot conceive it ſtrange, that this aſcent ſhould happen much more freely in the plant or tree while growing when it has a kind of life. The action of capillary tubes, in the aſcent of fluids, is well known; and there is no inſtance in which it has ſo neceſſary or ſo apparent force as in the preſent caſe.

Beſide this power, there is the attraction of the parts of the fluid to one another, which cannot fail ſtrongly to aſſiſt in carrying up the ſap to the tops of the higheſt plants.

The aſcent is continual, becauſe there is continual room made for the ſap in the upper parts, by the conſtant and uninterrupted evaporation.

A circulation has been ſuppoſed by ſome in plants, as in animals, but it is an error. There is a nutritious juice from the earth, thus ſent continually up from the root to the top of the plant in certain veſſels, and there is a deſcent of other juices received by the extream parts from the air, and carried downwards. This gave the notion of a circulation; and though erroneous, it was not an unnatural one: but we now underſtand vegetation better.

The motion of the ſap in plants is much ſlower than that of the blood in animals; and it is in various parts detained and retarded in the glands; where it is changed into various juices of different conſiſtences, colours, and qualities, on which depend the virtues and the value of the plant.

While this change is performing, the watery parts are exhaled, and the whole ſtock becomes richer; and thus the remainder at once nouriſhes and extends the ſeveral parts of the plant, and gives it all its ſenſible qualities. The groſſer and the more ſubtile parts of the general nouriſhment received by the root, are ſeparated in theſe operations, and the power of vegetation effects in a manner what we ſee done by chemiſtry from the ſame principle of ſeparation and combination. Do we wonder that inſipid earth and taſtleſs water give opium to the poppy or ſcammony to the bind weed? let us obſerve that from taſtleſs hartſhorn without any addition, the chemiſt brings a pungent ſpirit: and ſhall we wonder nature does this in the much finer veſſels of plants. Indeed we have been accuſtomed to look upon plants as conſtituting too mean a claſs in the great order of nature. Though they have not ſenſation, plainly they have many of the properties of animal life. They riſe from ſeeds as animals from eggs, and the difference between ſeeds and eggs is very little: they are nouriſhed by food taken in at certain deſtined parts; fine particles of mould, air, water, and the various ſubſtances with which theſe three are impregnated. They have their periods of growth as regular as animals. The oak they ſay is a hundred years a youth, as long mature ſtrength, and as long ſubject to the infirmities of age, under which at length it decays. This account is not ſo far from truth as vulgar obſervations often are: and in annuals we ſee the ſame courſe in a ſhort period. They are not deſtitute of motion, though they have not the power of changing place. The marygold cloſes its flower at night, and the abrus opens and ſhuts its leaves as we do our hands or fingers. The ſenſitive plant has yet more obvious motion. The courſe of their juices anſwers in ſome meaſure to the circulation of blood in animals, and they have various diſeaſes.

This places in a higher light the objects of the farmer's care, and ſhews him that it is eaſy to improve their growth.

It is his buſineſs to have them vigorous and full of good juices, and to this purpoſe he muſt ſupply them with good food. We have ſhewn the method by which this is to be done, and he may learn from reaſon as well as from experience, that if he direct his labours rightly, they will not be fruitleſs.

CHAP. XXV.

Of the management of moſſy ground.

BY moſſy ground is meant a ſoft boggy matter extending over large tracts, and containing in vaſt quantity the remains of vegetable ſubſtances, ſo as often to ſeem in a great meaſure compoſed of them. This ſoil is always damp and rotten, and it is in a great meaſure given up as uſeleſs. We have a great deal of it in Lancaſhire, and the neighbouring countries, and much more in Scotland and Ireland. The attempts made to drain and render it uſeful in England, we have given in the preceding part of this work; but ſince that there have been ſome new undertakings here, and ſome very rational thoughts publiſhed on the ſubject in Scotland. From theſe opinions and the practice of our countrymen, we ſhall be able to give ſome additional directions to the farmer or land owner who has ſuch ground.

There is always water pent up in theſe grounds, and this is one great reaſon of their barrenneſs. It takes a tincture from the vegetable ſubſtances which lie among it; often ſo ſtrong as to become a kind of tan, preſerving animal bodies for ages, when they have accidentally fallen into it.

Water thus impregnated cannot be proper for the growth of plants; and this quality, together with its abundance, is the great cauſe of the barrenneſs of theſe grounds. For the materials themſelves, of which the ground is partly compoſed, are no enemies to vegetation.

Experience proves, that all vegetables in a ſtate of decay, are a manure for other plants; and the ſubſtance of moſſy ſoils, we have obſerved, is principally compoſed of theſe. But we ſee how it is they may be uſeful, and how they are deſtructive: and this may be a leſſon to the farmer in his management of the like ſubſtances as manures. If he expects good from them, he muſt uſe them ſo as to make them decay, and the great article is moderate moiſture; where they are detained in a great deal of water, we ſee inſtead of decaying, they impregnate that fluid with particles which are enemies to vegetation. I know from repeated experiments and obſervations, that the water in theſe grounds conſtringes and hardens the extream fibres of roots, ſo as to ſtop all communication betweeen them and the reſt of the plant.

What farther relates to the compoſition of this peculiar ſoil, is the earthy part which has originally been lodged there, or has been accidentally waſhed down thither from the higher grounds. Mr. Maxwell juſtly obſerves, that on the nature of this depends in ſome meaſure the abſolute quality of the ſoil; but that is much more influenced by the degree of moiſture, and in this reſpect univerſally, the more wet it is, the farther is it from uſe in vegetation. The method of draining we have given before; and this is the firſt neceſſary ſtep: the next is deſtroying the original produce of the ſurface, which in the wet ſtate wherein the land has lain, cannot but be uſeleſs, and if not perfectly removed, would be pernicious. The beſt and moſt certain method is by paring it off, and burning it upon the ſpot.

This deſtroys all the remains of roots which run down deeper than the coat that was pared off; and it leaves an uſeful alkaline ſubſtance upon the ground.

Over the aſhes let there be ſcattered a large quantity of ſome harſh loamy mould. It need not be rich, for there is fertility enough in the natural ſoil itſelf, when it is brought into a condition for ſervice. The ſand in this addition cuts and breaks the ſpungy matter, and the land becomes at once ſerviceable.

This addition ſhould be made every year after, and with it ſome dung; and thus the fertility firſt given, inſtead of being loſt, as is often the caſe after a few years, will be continued and encreaſed.

In the preceding part of this work we recommended for ſoils of this kind, the ſowing the coleſeed plant; and we are proud to ſee they have carried this good practice to the remoteſt part of the kingdom with ſucceſs. The beſt method is to burn the thick haulm of this crop upon the land: and after a ſecond growth to prepare for feeding by ſowing clover and ray graſs: this will produce a very good profit, and will even, without the repeated additions of manures, which we have directed to be uſed if it were kept in tillage, preſerve the recovered ground in heart; and keep up a ſucceſſion of crops as upon other land.

Under the article feeding, this ground is to be treated in a particular manner. Being newly recovered from abſolute bog, it is not in condition to bear the feet of cattle, and having been enriched by plowing in the aſhes of the laſt crop of coleſeed, it does not want their dung for manure. Therefore the proper way of uſing theſe grounds, when ſown for feeding, is by cutting the crop, at a proper growth, in ſuch quantities as are wanted, and giving it to the cattle green in the racks.

This is a practice we have recommended on other occaſions, treating of the artificial graſſes; and there is great advantage from it in all reſpects. The cattle do not deſtroy the heads of the roots by treading them to pieces, nor by gnawing them too near the ground, and theſe being uninjured, ſhoot up much the ſooner and ſtronger from the cutting, than they can do from eating even in the moſt favourable manner.

We have obſerved often, that the garden is the ſchool for farming: and what is practiſed there will always be right ſo far as it can be introduced in the field. When young ſhoots of trees happen to be gnawed by cattle, the gardener cuts them off ſmooth below the part with his knife; or if any of the plants or flowers have been cropped by an unſkilful hand, he follows with the ſame inſtrument for the ſame purpoſe: his ſucceſs ſhews the truth of the general rule, that whatever is expected to grow again advantageouſly, ſhould be cut off with an even ſurface. It would be abſurd to follow the teeth of cattle with a knife; but it is eaſy to have the ſame advantage by keeping them off the ground, and cutting with a ſharp ſcythe what is needful for their ſupport, as it is required.

There will be none cut but what is eaten, nor any before it is wanted, every day's food will give a day more of new growth to the laſt, and a moderate field will thus keep a good quantity of cattle in ſucceſſion.

All this time the ground in the preſent inſtance is acquiring firmneſs, and that is a very eſſential article. The roots are at the ſame time ſtrengthening themſelves; and when the farmer has continued this courſe of cutting and feeding; and cutting for hay in other parts as long as he judges proper, the ground being become firm, the cattle may be turned in upon it. Their urine, their perſpiration, and their dung, will be of vaſt ſervice, and the growth will be too much ſtrengthened for the deſtruction it would otherwiſe be expoſed to by their feet. The dung will at once nouriſh this growth, and prepare the ground for a future crop; and when it comes to be plowed up, it will be no more of the nature it was of before the draining and improvement. If every thing have been conducted according to theſe directions, it will be a dry, black, looſe and rich ſoil; much like that fineſt of the black land in the fens, which has all the advantages of thoſe countries we have lying in the reach of the water.

The ground will now very well bear the common crops in the uſual order of huſbandry, and the farmer may conſider it as the reſt of his land; only he ſhould at times renew the dreſſing of aſhes, for there is a natural ſourneſs, as the farmers call it, in the land that has been very long wetted, which nothing keeps down ſo well as this practice. The great article is the alkaline ſalt which aſhes afford; ſo that if it be at any time inconvenient to burn the remains of the crop, a dreſſing of aſhes of weeds brought from a common and burnt elſewhere, will be of great ſervice: but nothing of this nature will be equal to the abſolute burning upon the ground where more is required, and where that regular proceſs can be performed with convenience; for there are oils and other parts in vegetables which go off with the ſmoak, and floating over the ſurface impregnate the ground; and what is much more than all the reſt, the very act of fire diſpoſes the ſoil to receive the influences of the air beyond all other things, and promotes fertility extreamly.

There is one diſadvantage attending the management of this ſort of ground, which is, that heavy cattle cannot be born upon it for the firſt ſeaſons, to do the neceſſary ſervices of opening the ſoil, and covering the ſeed of the firſt crop: all muſt be done by labourers; but this is not ſo heavy a taſk as might have appeared at firſt, for it is a ſoil that is more tender and more eaſily managed than any other. No one would conceive who has not ſeen the trial, how much of it an honeſt labourer will work in a day, and there is the advantage, that every thing which is done by hand is much better done than what is wrought in any other manner.

During all the time of recovering and of uſing this kind of land, an eye muſt be had to the drains, to ſee that they perform their office; otherwiſe all that is done elſe is thrown away. The ground will become drier every month till it is in the condition of land which naturally lies better; and the great proof that it is perfectly recovered, will be that rains take no more effect upon it than they do on other land.

We owe to Mr. Maxwell, a gentleman, who has very beneficially turned his thoughts to theſe ſtudies, the excellent hint of planting a recovered land of this kind with potatoes. We have on another occaſion ſhewed the farmer how very well worth his regard this root is; and there is no ground on which it will ſucceed better than on a recovered moſſy ſoil.

This root requires rich nouriſhment, and a free mould, where it can ſpread and encreaſe without ſtop or interruption; and this it has in every ſenſe perfectly in the ground of which we are now treating. The earlier the root is planted in theſe ſoils, the better; and the haulm at autumn, when the roots are taken up, is of an excellent kind for the ſervice of burning.

Where manual labour is moſt required, this root is propereſt of all, for it will anſwer the expence of garden tillage: and the gardener cannot have more proper ground for it. Therefore the farmer needs not ſpare this kind of management. His potatoe ground coſts leſs, and the labour, though it ſo far reſembles that of the garden, that it is done by hand, yet has not all the expence. The ground will be better dreſſed this than any other way, and the potatoe will anſwer to the difference between the price of common field tillage, and this by hand by the encreaſe in number, bulk, and excellence.

The diſadvantage attending potatoes on this mellow kind of ground, is, that they are more expoſed than in any other to the effect of the autumnal froſts. This is to be owned, and farther, that the more of the original moiſture remains in the ſoil, the more they will be expoſed to that miſchief; but it is eaſy to be avoided. It is for this reaſon that early planting is directed. They may in general be put into this ground a fortnight ſooner than into the common land, for as they will ſtrike quick in it, they will eſcape danger: and being thus early planted, they will be early ready to take up: particularly as they will encreaſe more and faſter in this land than any other. They will be fit for taking out of the ground with great advantage, before the danger of froſts arrives.

CHAP. XXVI.

Other crops proper for a recovered moſſy ground.

ANOTHER crop that will very proſperouſly ſucceed upon this ground, is the PEA KIND, and there are ſeaſons in which they fail in other ſoils, and which will make them on the contrary proſper better here.

Peaſe, even of the coarſer kinds, are properly a garden product, and they are therefore precarious in a field. The preſent ſeaſon has given us an inſtance of this, the peaſe throughout the generality of the kingdom have failed; and the diſtillery having been at the ſame time, in a great meaſure, ſtop'd in the uſe of corn, there has been no food for the hogs. Any man who could have foreſeen this, and have planted them in ſuch ground, would have made a vaſt advantage. This is another of thoſe crops which will pay the expence of tillage by hand upon ſuch a ſoil; for it puts the growth into the condition of thoſe in gardens, and the encreaſe will be beyond all thought greater upon ſuch a piece of ground ſo dreſſed, than upon the beſt land with field tillage.

WOAD is another crop that will ſucceed excellently upon a ſoil thus recovered from the moſſy condition; and will very richly repay any expence of tillage by hand, for the ſame reaſon, becauſe the produce will be much finer and more in quantity from ground wrought by hand, than from the common courſe of tillage.

The large leaves of WOAD require a great deal of nouriſhment; and they can never have this but where the ground is perfectly well broken and divided; this can be done no way ſo well as by the hand work of the labourer.

Nor is this the only occaſion on which the garden culture may be employed profitably in the field.

CHAP. XXVII.

Of moſſy land with a clay bottom.

IT is not an uncommon caſe that one of theſe moſſy grounds lies upon a clay, and that at ſo ſmall a depth under it, that when the ſurface has been burnt, the clay will come within reach of the plow.

Theſe ſoils, before they are improved, are the worſt of all the moſſy kind, but it is not difficult to make them the very fineſt by due culture.

No moſſy ground is ſo thoroughly wet, or ſo perfectly rotten as this which lies upon clay, but this will only tend to the advantage of the crops if they be rightly managed upon it; and the neceſſary care firſt taken to drain and render the ſoil firm.

The draining is in no caſe ſo neceſſary to be thoroughly and perfectly performed as in this, but it is in none ſo eaſy. The clay is a bottom, through which no wet from any cauſe can riſe; and as it generally carries a level ſurface, the drains need only be cut half a ſpade into the body of it, and all will be carried off. They muſt be numerous in ſuch a ground as this, becauſe it is not proper they ſhould be large, and they muſt be all carried in a perfect ſtrait courſe drawn by line and meaſure.

The boggy matter above will ſhrink in a ſurprizing manner, becauſe the greateſt part of its ſubſtance was watery, and there will in many caſes appear too thin a coat of the vegetable mould for ſervice.

This is a fault eaſily remedied, for a part of the clay may be after a time turned up among it: but this will require more caution than is uſually thought.

In general the land owner, who has ground of this kind, ſhould know, that though it appears the very worſt of the boggy ſort, it will be found capable of becoming the very beſt with a moderate ſhare of trouble; but he is to be told that none requires ſo much nicety and management in all the proceedings.

When it is drained by a number of theſe little cuts, the cauſe muſt be removed by one large drain opened according to the directions we have already given on that head, in ſuch manner and courſe, as conſtantly to carry off that wet which uſed to occaſion the moiſture.

The preſent wet being thus taken off, and the future occaſions of the ſame miſchief prevented, the farmer muſt wait with patience for the drying of the ſurface of the ſoil, and when this is in a condition to be pared, it muſt be done, but to no great depth; and in the ſucceeding burning, great caution muſt be uſed that it do not go too far.

The proper method is this, when the ſurface is pared off in this manner, let the parings be ſet up in light and ſmall heaps at diſtances from one another; and let there be alſo thrown down here and there ſome barrows of good paſture mould.

When the parings are dry enough to burn, let fire be ſet to them, and let the farmer ſtand over the burning with a watchful eye. The danger in common operations of this kind is, that the matter ſhould not burn enough; in this caſe it is, that it ſhould burn too much.

In the generality of land, the earthy part makes up the maſs; and this is only capable of calcination from the burning materials, which are the roots, and other remains of plants: but in this caſe the very ſubſtance of the ſoils, in a great meaſure made up of vegetable matter, which, though it was tan'd, as it were, in the wet, yet will burn very faſt now it is dry.

Two damages may ariſe from this, if a careful attention be not paid to the burning. The heaps of parings ſhould only be burnt to a red coal; but they will conſume to a ſmall quantity of light aſhes, if ſuffered to burn without ſtopping them; and as the very ſubſtance of the ſoil is in a great part compoſed of inflammable matter, that will alſo take fire from the heaps, and burn down to the clay.

A careleſs perſon might thus burn away the land he meant to improve, and leave only the clay.

The uſe of the earth that has been ordered to be laid in heaps at ſmall diſtances, is to prevent this. It will be neceſſary to ſtop the fire; and nothing does this equally with earth. Water is a poor extinguiſher of fire, in compariſon of mould. Wet only checks, but mould ſmothers it.

When the heaps are burnt to a red coal, let the mould be thrown on them; this ſtops the farther burning, and the aſhes will be full of virtue: the mould alſo becomes calcined, and is improved into a manure, the beſt of all others for the preſent ſervice.

This is the general uſe of the mould, but it may be wanted particularly. If in any part the ground take fire about one of the hills, or it ſeem burning downwards in the hill itſelf too far, a quantity of the mould muſt be thrown on. It will ſtop the progreſs of the deſtruction, and repair the damage.

When the whole ground is thus regularly managed, the fire muſt be ſuffered to go out, and the earth to cool; then advantage muſt be taken of a calm day, after a ſhower of rain, and the heaps muſt be broken, and the aſhes and mould ſcattered equally all over the ſurface.

This done, the ſooner they are plowed in the better; and thus the ground, be its depth never ſo little, will produce one good crop: after this, it will be neceſſary in theſe ſhallow ſoils to add to the quantity of the mould, by plowing up a part of the clay with it; but this muſt be done with caution.

The more is neceſſary to be ſaid on this head, becauſe a miſtake is eaſy: the plowing ſome of the clay up among the mould, is all that is required; and an author, of whom we have juſt ſpoken with deſerved reſpect, directs this to be done without farther care.

I have ſeen the experiment tried with very bad ſucceſs. The clay is too tough and heavy to mix with this light and looſe ſoil, and there is nothing here to break it. In ſuch ground I have ſeen the clay lie in looſe, thick lumps among the ſoil, and never in the leaſt mingled or embodied with it. Thus it chills the growth it was intended to aſſiſt in nouriſhment; and encreaſes the bulk of the ſoil, without adding any thing to its real quantity, as to the ſervice of the crop. The roots of what plants I have taken up for examination, have, whenever they come to ſuch a maſs of the clay, turned round it, and not in any part penetrated it.

This is the caſe in plowing up abſolute clay among a moſſy ſoil; perhaps that which Mr. Maxwell mentions may be loamy; and in that caſe, the ſand in its compoſition, when expoſed to the air, would break it, and it would mix with the clay. Little accidents in theſe things make great alterations.

In the caſe here named, ſuch as I have ſeen in ſome of the Engliſh moſſy grounds; the farmer is to improve his ſoil, by mixing with it a part of the clay, but he muſt alſo add ſome harſh and ſharp ingredient to tear that aſunder.

We ſuppoſe the ground now dry enough to bear the feet of cattle, and the common field management; the clay lying at a foot or more in depth, is yet ſomewhat moiſt on the ſurface, and is juſt in a condition to cut eaſily.

Let the plow be ſet ſo as to cut up about three inches of it; and to prepare for the breaking of this, let ſand, or ſome ſuch ingredient, be ſtrewed in a moderate quantity upon the ground.

The natural condition of our beſt ſoils, which are the hazely loam, is this: they conſiſt of mould, clay, and ſand, very well blended together: theſe three ingredients, when well mixed, make the beſt natural ſoil: and it is not difficult, in this caſe, to convert the preſent ground into ſuch by art. Here are two of the ingredients, mould and clay; there wants only the harſh part that ſhould cut the clay to pieces, and render it capable of mixing with the mould. This is eaſily added, and the moſt familiar and common in uſe is ſand. But ſomething of improvement may be thought of. If ſand be uſed, ſea-ſand, if in the neighbourhood, is the beſt; if this cannot be had, the cleaneſt and largeſt river-ſand is next in goodneſs; and if this cannot be had, the coarſeſt pit-ſand muſt be choſen, and this muſt be waſhed before it is laid on. The waſhing is eaſily performed, by pumping upon a large quantity, and ſtirring it about with a broom, till the water runs off clear. This is neceſſary whenever pit-ſand is uſed as a manure, becauſe there often is an ochery matter among it, which being full of particles of iron, is an enemy to vegetation.

If the farmer, who muſt of neceſſity uſe pit-ſand, thinks of his buſineſs in time, the ſand will be excellently prepared for this uſe, by throwing it in a heap open to the weather, and turning it once or twice. This is eaſily done; the rains will waſh it, and the effect of the ſun and winds will in ſome degree calcine it.

The beſt ingredient of all is, the duſt of limeſtone; if there be a quarry near, or if from a maſon's yard enough of the waſte of his work, excepting the refuſe of marble, can be had, it anſwers better than any thing. Theſe fragments cut the clay in the ſucceeding plowings, and the ſoil gets a laſting improvement, as their warm ſubſtance moulders away.

In ſome caſes moſs and thoſe weeds which were the original produce of this ſoil, will infeſt the crops ſown upon it. This generally happens from the draining, or the burning not having been ſufficient; and in this caſe it is of great uſe to add to the ſand, or ſtone duſt, a quantity of coal aſhes. There is ſomething in the nature of theſe that deſtroys the ſeeds or firſt ſhoots of moſs, and they will aſſiſt in mixing the clay with the mould, for the forming of a ſoil.

Theſe ſubſtances, whichſoever be uſed, muſt be ſcattered over the ſoil before it is plowed, and they will, after a ſecond plowing, ſhew their effect. The tough clay will be ſeen broken into ſmaller lumps, and mouldering away; by degrees this, with the ſand or grit, will mix thoroughly with the mould.

The ſoil will thus gain depth and a due firmneſs: the clay will give it a body to ſupport the crop upright, which is often wanting in theſe rich and mellow ſoils; the ſand, at the ſame time, will give openneſs and a free paſſage to the roots, and the mould will afford nouriſhment. This is the compleat compoſition of a ſoil; and there is ſcarce an inſtance in the courſe of agriculture, in which the farmer may ſo eaſily give the condition of the beſt ſoils, to one which is naturally the worſt.

There is this great advantage alſo, that the benefit is laſting. The good effect of manures, even of the beſt of them, laſts but a certain time; but when ſoils are made in this manner, the advantage remains for ever. The ingredients themſelves, and the neceſſary turning of the ſoil in mixing them, give fertility for the two or three firſt years; and the ground is for ever in a better condition to receive the refreſhment of manures.

If the farmer find he has given too much ſand, let him the next year plow up ſomewhat more of the clay; and, on the contrary, if he find after the firſt ſeaſon, that the clay remains in lumps, and unmixed with the mould, it is a proof that he uſed too little ſand; and he is plainly directed to throw on more. This is eaſily done before the next plowing; and its effect will be much more ſudden, than that of the other, for the clay being diſpoſed to break by the preceding addition, will be immediately torn to pieces by this, and the ſoil will be made fit for any produce.

CHAP. XXVIII.

Of preparing moſſy grounds for natural graſs.

NO uſe can be made of theſe moſſy grounds, till they are drained; but when that is done, if they are not wanted for tillage, nothing is ſo eaſy as to make them into paſture ground: and with due management they will produce what is very fine both for the ſcythe and feeding.

The moſt convenient of the moſſy grounds for this purpoſe, are ſuch as owe their wet condition to their ſituation under hills, from whence the rains drown them.

When a drain is made for ſuch a piece of ground, let a ſluice be ſet up, ſo that the effect of carrying off the water can be ſtopped at pleaſure, and the ſurface overflowed.

This preparation being made, let the ground be drained in the uſual manner, and the weeds pulled up by the roots. There will be no need of the expenſive article of paring off the ſurface, as there is in ſuch ground of this kind as is intended for tillage. Only when the weeds are gathered up, let them be piled in heaps at ſmall diſtances, and ſet on fire. Let a calm ſeaſon be choſen for this, and when the aſhes are cool, let them be ſpread over the ground. When the firſt hard rains come, let the ſluice be ſhut, and the water that comes from the higher lands thick and loaded with the fineſt parts of the ſoil, be ſuffered to cover the whole ſurface of the new drained ground.

The ſurface in this ſtate will be bare, and naturally level. The wet condition of the ground before draining, would have ſettled it even, and the large weeds having been burnt upon the dry ſurface, the moſs and low ſtuff which had been killed by draining off the moiſture, will have burnt with them. Therefore the natural condition in which the ground will be found at that time is bare and level. The water let over it will not be able at once to penetrate it ſo, as to make a bog of it again; and as it can be kept on as long as the farmer pleaſes, and let off again when he has a mind, there will be no danger of ſuch miſchief.

Let him keep the water on ſo long, as that it may depoſit its rich ſediment; and then by opening the ſluice, let him carry it off again. This muſt be repeated three or four times during the rainy ſeaſon, and the level ſurface will, by this means, be covered with a very delicate rich mould. The firſt coat of this will be thin, and it will crack in drying; the next will half diſſolve it, and fill the cracks with mud nearly of the ſame conſiſtence, and the ſucceeding will cover it entirely into a uniform maſs, and that of the fineſt kind for the growth of graſs that can be any way obtained.

This is introducing Ægyptian huſbandry; and by this we ſhall have, from our own art and induſtry, all the fertility the people of that country receive from the ſo famous and immediate gift of nature.

The conſequence will be, that not only a preſent crop will flouriſh, but it will laſt as long as the farmer ſhall take any care of it. The graſs that is to be ſown on it will penetrate through this light and rich coat, and ſpread its long roots into the new drained ſoil: the rains, which cannot carry off the light addition from the ſurface becauſe of its level ſituation, will waſh it in among the roots. At repeated times the ſame rich, but unexpenſive manure, may be added by the ſame means; and the crops will from year to year encreaſe with the abſolute quantity of the ſoil.

The firſt coat, which we have thus directed to be laid on, will effectually bury, choak and deſtroy any remaining ſhoot of the moſs or ſun dew, or other ſlight rooting products of the original ſoil; and the laſt will leave the ſurface in a condition to receive the ſeed of the ſucceeding crop.

Nothing is ſo ſlovenly managed in all the farmer's buſineſs, as the ſowing of hay ſeed; but on ſuch an occaſion as this, there cannot be too much care taken about it.

Naturaliſts reckon many hundred kinds of graſs, and among theſe, ſome will never grow well but upon damp ground, others upon none but what is perfectly dry. Some require a rich mould, and others will not ſhoot unleſs upon a warm gravel. In ſowing of graſs the farmer, when he has occaſion to do it, takes the ſeeds of any of theſe kinds, and ſcatters them upon the ground in as careleſs a manner as he had gathered them. Is it a wonder he has little ſucceſs!

The true method is this, chuſe the ſeeds from ſuch graſs as has ſtood on a ſpot not unlike that whereon it is to grow; and for the preſent purpoſe, the very beſt choice is from a meadow that lies low, but not ſo as to be overflowed. From the hay of this meadow let the ſeed be ſav'd; let the farmer keep it with care till the time when it is wanted, and then ſow it with a plentiful and even hand, at a time when the laſt overflowing of the recovered ground has been ſo long off, that the mud left on the ground is juſt hard enough to bear a labourer's feet.

When the ſeed is thus ſcattered in a calm day, let a labourer go over the ground with a ſmall buſh harrow, ſuch as we have deſcribed in the preceding part of this work, and thus tear up the light ſoft ſurface of the mud for burying the ſeeds.

The reſt may be left to nature: they will ſhoot quickly in ſo favourable a ſoil, and the place will be covered with a thick and excellent verdure.

The innumerable roots of the graſs will bind together the new coat and the under ſurface, and there will always remain the power of overflowing the ground, and of lodging a new and large quantity of manure upon it without expence.

The firſt years crops can be only mowed, for the land will not bear the treading of cattle to feed upon it; but if two crops be cut this year, the roots will be only the ſtronger and better for it.

After this it may be treated as any other graſs ground, and from being a piece utterly uſeleſs, it will become of equal value with any the farmer has for paſturage.

The convenience of overflowing is of great advantage, becauſe it adds a fine ſoil, and ſaves manure; but moſs ground may be made fit for paſturage where there is not this particular convenience. Draining is, as in other caſes, the firſt article, but after that is done, the ſoil muſt be improved before good graſs is to be expected, for it wants many of the requiſites to bearing it.

This is to be done by the addition of ſome laſting ingredient, and nothing is better than abſolute paſture mould. The beſt kind is that which is of the nature of what we call hazely loam; and that which has in it a good proportion of ſand, and ſmall ſtones is the beſt. Theſe work their way into the ſoil, and warm, break, and divide it at the ſame time that the mould gives it abſolute fertility.

This dreſſing will be expenſive, becauſe it muſt be laid on in large quantity; but if the drains be properly made, and the dryneſs of the ſoil continue, the laſting advantage makes very good amends for the firſt charge, for by this means the before uſeleſs ground is put into the condition of a good natural paſture, and will require afterwards nothing beſide the common care. The ground thus rendered fertile for paſturage, will be in all things the ſame as if it had been originally ſuch, and with the uſual dreſſings of dung and pond mud will be always in order. There is no ſoil on which dung takes a more happy effect than this; but the care muſt be to lay it on at a proper time, or its virtue will be loſt. The older the dung, provided it have not loſt its virtue, the better it agrees with this land, and it ſhould be laid on before the firſt ſpring rains.

A dreſſing of the common kind will anſwer very well for three years graſs upon this ſoil; but if this quantity be divided into three portions, and one of them laid on every year, it will anſwer much better. The price of carriage and the trouble of ſpreading are ſo little in this article, that this is by far the beſt method of dreſſing.

CHAP.

CHAP. XXIX.

Of the management of the worſt kind of moſs land after draining.

IN the common courſe of things the methods here laid down for the recovery and preſervation of moſs land in a ſtate of uſe will anſwer very well : but there are ſome ſoils of this kind, which though they have been ever ſo well drained at firſt, and ever ſo properly managed afterwards, will ſhew ſigns of returning to their old condition, not in the dampneſs ; for if the drains be well cut, that is impoſſible, but in the bad growth. In this caſe moſs uſurps the place of graſs in paſturage, and the little four weeds which uſed to riſe upon it, appear among the crops from tillage.

The remedy is not difficult. If moſs be the caſe a mixture of lime and coal aſhes ſprinkled on early in ſpring, deſtroy that and recover the land, if the other caſe, lime alone.

This is the difference that ſucceſsful practice ſeems to eſtabliſh in the two caſes : in paſture grounds moſs alone is the interruption of the growth, and for this evil a good quantity of aſhes with the lime are the proper remedy ; but in plowed land the appearances of the ill condition of the ground returning are various, but lime mixing freely in the ſoil deſtroys them all.

CHAP. XXX.

Of the uſe of moſſy ſoil as a manure.

AS we ſee that common poor paſture mould laid upon a piece of a recovered moſſy ſoil, reduces it to the condition of very good ground, it is eaſy to perceive that the mixture of mould and this ſoil makes rich land, and it is a very natural thought to bring the moſſy ſoil as a manure to ſuch paſture ground, as well as that mould for a manure for the moſs. This practice and experience alſo confirm. We have the firſt inſtance of it from Scotland, but it is a very ſtrong and ſucceſsful one. Mr. *Heron* of Bargerly improved a light weak ſoil in tillage, by the addition of moſs as a manure, ſo as to make it bear repeated and profitable crops ; and Mr. Maxwell has communicated it to the publick among his excellent papers on huſbandry.

From what we have ſeen in England of this, we ſhall be able however to give the farmer one practical caution. There are ſeveral kinds and conditions of moſſy grounds, and all of them are not equally proper for this ſervice.

There is one kind of the nature of peat, which is by no means fit: it is ſo tough that it will very difficultly be got to pieces, and ſo ſour, that it rather hurts than improves the ground: there is alſo another kind which is heavy and tough, and no more proper than the former. The moſſy ſoil I have ſeen uſed with ſucceſs, is full of rotten wood, ſticks and branches of trees, with hazel nuts and other fruit, yet remaining in their perfect form. The ſoil which contains theſe, is the lighteſt of all the kinds and the moſt fertile. The liquor which has filled this earth has preſerved theſe, as it will preſerve even the fleſh of animals: but when they are expoſed to the air and ſun, they dry and moulder away; and become a rich and excellent manure.

The farmer will not be doubtful of this who remembers the general obſervation, that all vegetable ſubſtances in decay become a manure for land; which is an invariable truth.

CHAP. XXXI.

Of the management of exhauſted ground.

BY exhauſted ground the farmer is to underſtand ſuch as has been in its nature tolerably good, but has been drained by repeated or ill managed crops, beyond what the common manures are able to ſupply.

This is the caſe of a great deal of land in our kingdom; and if thoſe who complain would uſe the proper means, they would find the damage not ſo hard to be repaired as they imagine.

Long fallows will recover the moſt exhauſted land, provided it has been ever good, and the ground be ſufficiently broke during the fallowing: but in this caſe the labour and time neceſſary for the recruit weary the farmer, becauſe he receives no preſent benefit. It will be more agreeable to him to lay out more expence, and to reap a more immediate return.

In this caſe the advice given by the Edinburg ſociety to Sir James Ferguſon, and publiſhed among other excellent papers in the volume which the publick owes to Mr. Maxwell, will be of excellent uſe.

It is fit on this occaſion to give that ſociety its juſt praiſe. Other bodies of a like kind declare againſt ever giving their opinions as bodies, the fear of being miſtaken overcoming the hope of utility: but this ſociety conſulting and conſidering utility only, receive ſtates of particular caſes, and give their advice. This Mr. Maxwell has made general by his publication; and more than their own kingdom are obliged by their labours.

It is no more than juſtice to add, that whatever theſe gentlemen have given as their opinion in that kingdom, the practice of this confirms: but as agriculture is more advanced in England than Scotland, while we adopt, it may often be in our power to add ſomething to their opinions.

In the preſent ſubject which they have conſidered at large, the remedy doubtleſs lies in giving a new ſoil. This may be either brought on from elſewhere, or raiſed from greater depths in the ground. The latter is the eaſier method, but all ſoils are not deep enough to bear it. Therefore the firſt conſideration is the depth of the mould.

If this be no more than is uſually kept in tillage, or than is in the common courſe of labour turned up by the plow; ſome freſh ſoil muſt be brought on, or manures that are of the nature of ſoil, river mud, marle, or paſture mould.

In this caſe the care of the farmer muſt be to ſuit his addition ſo to the nature of the original ſoil, that it may ſerve at once as a new earth and a manure. This will be found treated at large in the firſt volume of this work, where we have conſidered ſoils and manures.

In the other caſe, where there are ſeveral inches of good ſoil below the utmoſt depths to which the plow has ever gone, the whole buſineſs is to cut deeper, and turn it up.

For this purpoſe, if the four coultered plow be brought into the ground, and ſet to its proper depth of cutting, it will go three, four, or even five inches below what other plows have done; and will bring up an abſolute bed of new mould.

The old exhauſted part of the ſoil will be buried at the depth where this lay; and this, which is of the nature of virgin mould, will be the proper ſeat of the next crop.

The advantages of virgin mould are well known; and this part of the ſoil, which will be thus turned up after ſuch abſolute and unexhauſted reſt, will be perfectly of that quality. The roots of corn and of the other plants cultivated by the farmer, ſeek their nouriſhment where the earth is broke by tillage to give them paſſage. The preceeding crops upon ſuch grounds have been fed by that part of the ſoil only, which has been wrought in tillage; and this part which is now broke for the firſt time, having been firm and ſolid at its proper depth, has denied them all admittance. Therefore it is now in full ſtrength. The farmer will ſee that it is by his crops, and he is to manage it in this manner.

He muſt take care that his four coultered plow cut up this under part of the ſoil every where, and in all parts equally. He muſt ſee that the part thus brought up make the ſurface of the whole field, and that the old top be every where buried.

This once done, there is to be no more of the deep plowing: the common courſe of work is to be continued, and this new earth very well broke.

After this it is to be ſown as other good land; and refreſhed in the ſame manner with manures; and after a courſe of many years, it will be proper to bring on again the deep cutting four coultered plow; and burying the upper ſoil, to bring up again that which had been in the preceeding time the exhauſted ſurface.

It will have received new ſtrength from its long reſt, and from the vapours from below, and will be as rich as the former. One caution only needs to be given the farmer on this head, it regards the crops he is to ſow upon the ground, all the common kinds are free to him: corn of every ſpecies, all the pea and vetch kinds, turneps and clover, what he is to avoid on the deep rooting artificial graſſes. If he ſhould raiſe ſaintfoin on ſuch a piece of ground, and expect afterwards the old ſoil, when turned up, to be freſh and full of virtue, he would be diſappointed; for the roots of ſainfoin draw their nouriſhment from great depths, and the buried part of the ſoil would be thus drained of its nouriſhment perhaps faſter than it was recruiting.

For the ſame reaſon this benefit is not to be expected even in deep ſoils, where there has been a crop of ſaintfoin; for the under part of the ſoil, though not touched by the plow, nor at all affected by common crops, would be exhauſted by this deep rooting plant; and in this caſe, though the ſoil be ever ſo deep, the only reſource for its improvement,

ment, when exhauſted, muſt be the bringing on new mould as directed in the caſe of ſhallow and exhauſted ſoils.

CHAP. XXXII.

Of the management of this land after plowing.

THOUGH there be no more deep plowing required after the firſt, ſuppoſing that to be well done, yet there will need a great deal of care in that; and a repeated tillage of the ſoil, though of a lighter kind, in the ſucceeding time.

The firſt care is picking out all roots of perennial weeds. The turning up the earth to this depth gives a very good opportunity, and it ſhould not be omitted. If a boy follow the plow for this purpoſe, the work will be done at once: but there need not be any nice care on that occaſion, becauſe the harrowing that muſt come after will clear away the remainder.

This harrowing is very neceſſary for breaking the clods of the new ſoil, and mixing it with the old. It ſhould be done with a great harrow, ſuch as we have deſcribed in its place; and after this, in a dry ſeaſon it will be proper to go over it with a very heavy roller to cruſh and break it more, and then to harrow it again with a common harrow.

If this be properly managed, the plowing which follows in a common way, will put it into a condition to receive the ſeed corn, and from this time it may go on in the uſual courſe of tillage.

CHAP. XXXIII.

Of the management of land according to its ſituation.

THE keeping up a due proportion of the ground in tillage and paſture, is an article of great importance to the farmer: and at preſent it ſeems to have been ill conducted in general throughout this kingdom. While we pay the moſt extravagant price for corn, the people concerned are applying to the government for liberty to bring in live cattle, becauſe they have not enough for their feeding grounds. It is plain they have encreaſed the quantity of paſture at the expence of the tillage.

Let the farmer be aware of this in his private concerns, for he ſhews the diſadvantages of the nation.

In proportioning his ground for this purpoſe, he will find ſome that is naturally calculated for and appropriated to paſturage, and other parts which are in the ſame manner ſet apart for tillage; but there will be alſo ſome of a middle nature, which may ſerve with the proper management for one of theſe purpoſes as well as the other. This is the kind of ground, which when he has occaſion to change the proportion of paſturage and tillage in his farm, he is to convert from one of thoſe ſervices to the other; and this, in the common ſtate of things, he is to allot to the one or to the other of theſe purpoſes, according to the preſent occaſion: or if at liberty on that head, he is to be guided by its ſituation.

In general lower grounds are fitteſt for graſs, and thoſe ſomewhat on an aſcent for tillage: but in a piece of ground where the choice is indifferent, let him be guided by the degree of the deſcent. If the place be expoſed to rains and the waſhing of higher grounds; and there be alſo a large and ſwift fall from it to the lower, it will be beſt to lay it for paſturage; becauſe in that caſe the turff will cover and preſerve the manure, which ſhall be firſt given to the land; and the entangling blades of graſs will detain ſome part at leaſt of that fine mould which is waſhed from the higher ground, and which will ſerve as a manure for the paſture; whereas if this piece of land were put into tillage, the waters of floods running down from the higher grounds, and over this would carry away with them not only that light mould which enriches it, and which would be detained by the graſs; but the very manure alſo with it, which ſhould have been laid on to enrich that ſpot.

Thus by a different conduct, the ſituation of the ground will be either an advantage or a diſadvantage.

This is the direction which reaſon gives, and which experience confirms, reſpecting the ſituation of various lands: and by this management alone, I have ſeen the difference one half the value of the produce, between adjoining grounds upon the borders of the fens in Lincolnſhire, where one has been thus managed according to the neceſſity of its ſituation, and the other without regard to it. A great deal of good land in that part of the kingdom lies ſhelving toward the fens, and under the courſe of much water in flood times from the higher grounds beyond it.

The ſoil in this border of riſing land, which joins upon the fenny flats, is the ſame with that of the fens themſelves, a rich, mellow, dark mould; and this, although it be but moderately fertile in the fens, where it is ſubject to too much moiſture, yet in thoſe lighter grounds where it is dry there is no ſoil richer.

This is proved by the large crops it yields when tilled for corn; but theſe laſt only a few ſeaſons, and then no art recovers the firſt ſtrength of the ground.

This depends entirely upon the ſituation of that land; and it is fit we ſhould explain it, for it is not in Lincolnſhire alone there is rich earth in this ſituation; nor can juſt directions for one piece be given that will not be uſeful for others.

When a piece of graſs land in the country juſt named, which lies in this ſituation, is broke up for tillage, the firſt years crop is very great, the ſecond tolerable, and the third poor.

The reaſon is not only the exhauſting of the ſoil by three ſucceſſive crops, for that it has only in common with other land, and could bear it better than any other, becauſe of the great natural fertility: but all this time the rains from the higher country are waſhing away the fine part of the mould, on which this fertility depended, and conſequently that character of excellence is loſt; it is vain to repair it with dung, for that manure being lighter than mould, will be waſhed away yet more eaſily; and after the advantage of a very few crops, the farmer will find his land has altered its very nature. The proper conduct, now this condition of the land is known, and the cauſe known with it, is eaſy.

If there be choice whether to lay ſuch a ſloping piece of ground in tillage or paſture, it ſhould be made paſturage: if on the other hand, the circumſtances of the farm require it ſhould be in tillage, let due caution be uſed.

I have ſeen in Lincolnſhire a ſafe and effectual method of preſerving this ground from being waſhed away by floods from higher lands. It is by running a firm, but low bank at the head of the land for its whole length, and cutting a ditch for paſſage of the water cloſe on the other ſide.

There requires ſome ſkill to contrive this properly, but the labour and expence are little, and it is much more than a defence; it becomes an abſolute benefit to the land.

The bank need not be more than two foot and a half high; and the earth of the ditch will make it. It ſhould be carried not ſtrait, but if the nature of the ground will allow it, with a little ſweep the ſwelling out a few yards in the centre will give compaſs enough, and this will prevent the water from the hills beating with its full force againſt the whole flat ſurface.

The ſwell in the middle muſt be rounded, not brought to an angle; and the riſe of the bank muſt be all the way ſloping.

Theſe are the proper cautions againſt ſuffering by the fury of the water ruſhing down in floods. The ſame force which would have burſt through a ſtrait bank, or beat to pieces a perpendicular one, will be thrown off on each ſide and waſhed ſoftly up the middle in theſe rounded and ſhelving conſtructions.

The ditch is the next conſideration, its depth ſhould equal the heighth of the bank, and its width at the top the diameter of the bottom of the bank. It muſt be ſomewhat narrower and ſhallower in the middle, and grow deeper and broader by degrees all the way.

At every ten feet there ſhould be laid ſome pebbles or brickbats through the baſe of the bank, to give paſſage for a little of the water while the dangerous quantity is thus carried off; and by this means there will be the advantage of lying under higher land, while all the diſadvantage is removed.

This I have ſeen practiſed on the edge of the fen countries, and it is of ſo much benefit to this kind of land, that one cannot but wiſh it were made univerſal.

CHAP. XXXIV.

The Iriſh method of raiſing hops on bogg ground.

THE ſpirit with which the improvement of agriculture is purſued throughout this kingdom, and in Scotland, and Ireland, muſt give the higheſt ſatisfaction to all who wiſh well to their country, as it promiſes a vaſt advantage. The method to make the attempts moſt uſeful, is to render them as univerſal as poſſible: this the Scotch ſociety have done for their country, by repeating and recommending the diſcoveries made and publiſhed in Ireland; and this we ſhall attempt by communicating in the ſame manner whatever is well authenticated as practicable and uſeful to the Engliſh farmer.

The preſent ſubject is of a very ſingular kind, and from its importance deſerves the greateſt attention. We have given the general management of boggy land in our firſt volumes, the particular improvements made ſince in Scotland, and the lateſt advantages found in England, in the preſent; but we are here to add an attempt of the boldeſt kind made in Ireland; and its ſucceſs which has been ſuch as gives great honour to the inventor.

There is a peculiar kind of boggy land, which from the quantity and colour of the water lodged in it, is called in ſome places RED-BOGG, and in others FLOW-MOSS. This is the worſt of all boggy land, and has been in general given up as incapable of any good produce. In ſome places it is cut up as a kind of fuel under the name of peat; tho' very inferior to what is properly called ſo. In thoſe parts, where being more dry, it yields ſome benefit, this is the leaſt that can poſſibly ariſe from land, as it is no more than the moſt poor kind of paſturage.

The greateſt part of the red bog in Ireland bears no rent, but is thrown into the purchaſe or leaſe as unprofitable ground: in general it bears no produce, not even graſs, but appears naked, ſpungy, and raiſed in hills and holes; and is even uſeleſs after burnbaiting, the aſhes it yields being ſmall in quantity and inſipid.

The improvement of this ground for hops muſt be begun by draining. To this purpoſe mark out the quantity intended to be planted, and dig round it a trench two yards and a half wide, and deep enough to drain the ground. Cut the drains ſtrait, and begin by paring off the upper ſods. Cut theſe no larger than may be eaſily managed with a pitch fork, and carried off in wheelbarrows: this ſhould be uſed to fill up holes, and a part of it reſerved to face the trenches.

This being removed, the reſt of the digging is through a kind of turff which cuts eaſily; and will pay the labour, as it ſerves as a kind of fuel.

Leave one or more paſſages over the trench into the land within: bridges would be expenſive, and that charge is eaſily ſaved by the natural ſoil. Leave a piece in two or more places uncut of twelve feet broad, and let the workmen bore a paſſage through it at a due depth for the diſcharge of the water.

Bog ground cuts ſo eaſily, that all this is done with leſs trouble than could be conceived: two labourers, one on each ſide, will eaſily dig through at a proper depth and breadth till their tools meet, and they will thus form a natural arch; and the ſubſtance drying above, there will be a ſolid paſſage over for men and carts, and a free courſe under for the water.

At the loweſt part of the trench or drain, where the water is to run off, let a ſolid bank be made two foot high above the bottom of the trench, and carried ſtrait acroſs it.

This will ſtop ſo much of the water as will fill the drain to this depth, and there will be no hurt to the ground, and great benefit ſeveral ways.

The advantage is plain, in having water always near the crop to ſupply it when wanted in dry ſummers; and there will alſo be a very valuable manure, for the bottom of the drain will fill by degrees with an excellent and rich mud, which will improve the reſt of the ſoil.

As the draining of bog land, and keeping it dry is one of the firſt conſiderations in all ſuch improvements, ſome may fear that the keeping ſo much ſtanding water in the bottom of the trench would defeat that purpoſe, but experience ſhews otherwiſe. Water may be detained at a depth without hurting the land, if it have a free courſe at the top, and that ſufficiently beneath the level. Indeed it may be kept nearer the ſurface than thoſe would think who have not tried; for while the courſe is free over this head, the quantity that is kept in has no force againſt the land.

CHAP. XXXV.

A proviſion for poles.

AS the land under conſideration in this place is intended for hops, the huſbandman ſhould provide in time for poles; and this will be eaſily done in his own ground. A yard and half within the trench which is carried round the ground, let him open another; this need be only two foot wide and two deep, let it be filled up with ſoil, and plant in it ſallows, and ſuch other water trees as will grow quick, and riſe ſtrait for this ſervice. They will be growing while he is preparing the ground, and a proper quantity will be ready by that time he wants them.

Let them be trained up from the beginning to a ſtrait growth, and all ſide ſhoots taken off.

When they have ſtood two years, let the bank be cut at the bottom of the drain, and the water being run off, let the mud be taken up and laid to the roots of the plantation. This will act as a rich and excellent manure for them. They will be ſupplied with that moiſture which is ſo eſſential to them, from the gradual draining of the bog; and from time to time afterwards they may be watered with great eaſe from the drain. The bank is to be made up acroſs its bottom as ſoon as the mud is cleared away, and water for this and other ſervices will be ready in it as before. Four years from this time will give the ſallows, or other trees the due growth for poles; and they may after that be eaſily ſo managed as to ſupply the ground without doing it any injury.

We have, in our account of the hop, given cautions againſt either expoſing the ground too much or choaking the plants by trees; this muſt be carefully obſerved, for it would be better to bring the poles from a diſtance than to hurt the plants: but with due conſideration, there may always be had a ſupply of them in this manner, ſo that they will improve, not hurt the ground. A certain ſhelter is required for a hop ground, as well as free air, and this is the way to give, both leaving the growth againſt the dangerous quarters, and clearing it away where the air ſhould come.

CHAP. XXXVI.

Of making up a hop ground.

THE bog being drained, the regular plantation of the hops comes next into conſideration; and in this there is conſiderable difference from the plantation in any other ground: the diſtances of the hills, according to the gentleman's propoſal who invented this improvement, is to be nine foot one from another, and the firſt row fifteen feet from the edge. Different circumſtances may make variations in this reſpect proper; but as we have not the advantage of experience, we ſhall by no means alter the original plan: how far it may be reaſonable to alter diſtances, and to make other variations from the ſtrict rule; the farmer may judge by a careful reading of our general account.

The plain and eaſy way to mark the places of the hills, is by a line in the manner of the gardener's work; firſt, tie knots in this line at every nine foot, then plant one of the ſtakes fifteen foot from the inſide edge of the ditch made for the ſallow plantation: draw the line ſtrait, and put down the other ſtake at fifteen foot diſtance from the ſame ditch at the other end of the ground. This line marks the firſt row of hills: thruſt a ſharp pointed ſtick down at every knot in the line, and thus is marked the place of the firſt row of hills.

Then remove the line nine foot farther, and mark a ſecond row in the ſame manner at that diſtance from the firſt, and in this method continue through the whole ground.

At every place where a ſtick is planted, dig a hole a yard in diameter and a yard deep. The upper ſods which are dug out, will ſerve for filling up the hollows in the bog itſelf; the under ſtuff may be cut into peats or turfs; and ſhould be carried off the ground to dry, that it may not be in the way of the other work.

Theſe holes are to be filled up with a good ſoil for the growth of the hop; and the eaſy method is this. Pare off the turff in a paſture near the bog, and burn it as ſoon as it is dry enough for that purpoſe: then ſcatter theſe aſhes over the ſurface, and add a little lime and dung well rotted, ſuch as comes from an old cucumber bed is beſt of all, plow all theſe well into the ground, and they will make a proper ſoil for the hops.

There is a neceſſity of fixing upon a ſpot near the ground that is to be planted, becauſe the carriage of ſuch a quantity of mould to a diſtance would be inconvenient and expenſive; and if the ſoil is not good enough in the place thus pitched upon, it will be proper to mix ſome very rich and mellow garden mould with it.

The hop plants are to be got ready, and the earth thus prepared is to be thrown into the holes. The plantation is to be made in the manner we directed, and the produce will equal that of hops upon any other ground.

The expence of bringing in the mould to fill the holes, is the great article; and there is ſo much ſav'd in the reſt of the work, that this need not be grudged. The perſon who publiſhed the propoſal tried it by a long experience before he communicated it to the publick, and none need doubt its ſucceſs.

CHAP. XXXVII.

Of the particular advantages of this method of planting.

NONE can be blind to the firſt benefit of this manner of planting, becauſe it recovers into uſe a kind of land which is given up by the proprietors in all other conſiderations as uſeleſs: but beſide its adding as it were ſo much land to the community, there are particular benefits to the hop itſelf in this method.

The expence of keeping the land in order is much leſs than in any other hop ground, and the produce when well managed, has as perfect a flavour as moſt eſteemed in the hop countries.

There is an obſervation among the planters of hops, that the grounds never thrive unleſs the whole ſurface between hill and hill be clear.

For this reaſon they are at a great expence in paring off the ſurface, hoeing, weeding, and the like operations. All theſe are ſaved in the management of this kind of ground; the red bog keeps itſelf clear many years from weeds, even when it has been drained, and the ſurface being bare, reflects the ſun-beams; that being the great advantage in the opinion of the planters, which the naked ſurface gives.

There is an advantage in throwing the parings of the ſurface in common hop grounds, about the ſtems of the plants; raiſing by this means the hills, and ſtrengthening the growth. This cannot be had it is owned in the bog grounds, but the trouble is ſaved as well as the advantage loſt, and the ſame labour will bring in freſh ſoil from the neighbouring paſture, which may be laid upon the hills with more advantage.

Another benefit to this plantation of the hop, is the conſtant ſupply of water.

All know how greatly hop grounds ſuffer in very dry ſeaſons; and there is a great ſuperiority in theſe, becauſe they can be always, and very eaſily watered. The drain which goes all round the ground is conſtantly full to a certain depth, and the water which is eaſily given the plants from one or other parts of this drain, has nothing of thoſe hurtful qualities which bog water in general is ſuppoſed to have; which makes it unfit to promote vegetation. Theſe qualities it gets by lying upon and near the ſurface of the bog ground: when it is thus received at once from the ſource into the drain, it has none of them.

No hop grounds are ſo free from the common accidents as theſe, which are made from bogs. They are ſheltered from ſtorms generally by their low ſituation: and yet they do not ſuffer, as others in flat countries do from the rainy ſeaſons, becauſe the ſpungy ſubſtance of the ground naturally lets in the wet freely, and lets it out as freely by the drain; ſo that nothing of it ſtagnates about the roots of the hops.

In the common hop ground inſects are at certain ſeaſons very miſchievous, but we ſee nothing of this in thoſe made from bogs, they are free when the reſt are moſt infeſted.

The poles ſtand very firmly in theſe hills, for the ſubſtance of the bog, when drained, compreſſes them by its ſpungy nature, and keeps all together.

The only diſadvantage to which theſe grounds are liable, is the neceſſity of renewing at certain times the earth in the holes.

The roots of the plants have not any advantage from the intermediate ſpace, which is not of a kind to afford them nouriſhment. But as a great deal of labour is ſaved in the culture of this kind of ground; ſomething more than the ordinary ſhare may very well be allowed for the purpoſe of refreſhing thoſe particular ſpots wherein they grow.

The gardener's method muſt here be introduced: he refreſhes and invigorates his plants in pots by taking off a part of the old mould and ſupplying the place with freſh, and the very ſame may be done here. A plant growing in a garden pot is in the ſame condition with the hops in theſe holes: it has only a certain quantity of mould for its nouriſhment, with no advantage from the ſpace beyond thoſe limits: yet theſe plants grow well; and what is very much to the preſent purpoſe, they uſually flower better than ſuch as ſtand in the open ground.

The gardener, to ſtrengthen theſe, pares off the ſurface of the mould and puts in freſh: it is eaſy for the planter in the ſame way to take off the upper ſurface of the mould in the holes, and bring freſh in the place.

When more is neceſſary, the gardener pares away the mould at the ſides; or takes up the roots entirely, and filling the pot with freſh earth, plants them in again. Theſe are the various practices of the gardener according to the condition of the plant; and thus the hop planter on the bog may ſtrengthen his plants. He may cut away a part of the mould, near the outer edge of each hole, the whole depth, and taking off that as well as the ſurface, he may put freſh compoſt, ſuch as he uſed at firſt of paſture mould, lime, and dung in, its place: or he may, in caſes of extream neceſſity, remove the whole mould out of the holes, and bring in freſh in its place: nor will this be ſo bad a caſe as may be imagined. The hops will have afforded him a great many years valuable produce before it comes to this; and he may therefore afford the labour and expence. His ground will be after this, to all intents and purpoſes, the ſame as a new one; and there is a very great advantage beſide. The bog ground itſelf, when it has been ſeveral years drained and expoſed to the air, will by degrees have received their influence and altered its own quality. Inſtead of being ſpungy, it will be become in ſome degree brittle, and the ſhoots of a few natural weeds of better ſoils, will ſhew that it is beginning to take the nature of ſuch land.

The quantity of mould thrown out of the holes will be extreamly great: it muſt be ſpread over the ſurface in the intermediate ſpaces, and it will cover them ſome inches in thickneſs.

This will by degrees become rich and vigorous again, for having been exhauſted only by the natural growth of plants, it will be perfectly recruited by the fallow: it will be ready for ſupplying the place of the ſurface of the earth in the holes to a great advantage, and that which is taken away may be with equal benefit as the firſt ſpread in its place. The mud from the bottom of the drain being taken up at times alſo, and laid to the roots of the plants, will in its courſe come upon the ſurface, and thus the bog will be rendered a fertile piece of ground, not only in the holes where the hops grow, but univerſally: not fitted for hops alone; but for all kinds of crops.

This is a method of improving bog land, by which it will have all the advantages of common good paſturage or tillage ground; and though it takes a long time, this will not be perceived, for the hops will be all that while yielding their valuable produce.

All hop grounds in the common management wear themſelves out in a certain time; and muſt be converted to other uſes, while the hops are planted in ſome other place. In this courſe of management one piece of boggy land would be drained and improved by them after another, and the publick would receive conſtant benefit.

CHAP. XXXVIII.

Of the uſe of ſea wrack in Scotland.

WE have named among manures the plant called fucus or ſea wrack: it has various names among botaniſts, and more among farmers; and it is to be diſtinguiſhed according to its kinds, ſome being of a more firm, and ſome of a more ſpungy nature. In Scotland they uſe it upon the very worſt land near the coaſt with great advantage, and they would uſe it elſewhere in the country, if there were convenience of carriage. Mr. Scot has given a practical and uſeful account of it in the memoirs of the ſociety of that kingdom, publiſhed by Mr. Maxwell, and the ſociety have added uſeful hints for farther improvement.

As the huſbandry of Scotland and England differ, and even the huſbandmens language in thoſe two kingdoms, we ſhall explain their meaning to the farmer; and add what late experience has ſhewn at home.

In Scotland they call this manure WARE and SEA WARE, and they diſtinguiſh into two kinds according to their manner of getting it. Theſe are the FLOAT WARE and the ROCK WARE, the firſt is brought on ſhore by the tides, and they take the opportunity of carrying it to their lands before the next flood waſhes it away again: the other is native of the rocks, and they may take it off when they pleaſe at low water.

The caſe is the ſame upon the Engliſh coaſts, and the difference between the two kinds is ſo great, that the farmer ought to be thoroughly acquainted with it.

The *rock ware*, or that kind which he pulls from the rocks, is the plant called ſea oak or ſea wreck, it grows alſo on pebbles on the coaſt, and ſometimes on ſhells; this is a tough weed and is impregnated with ſea ſalt: there are alſo many ſmall inſects always living on it. Theſe help the enriching quality; and by means of all together, it becomes an excellent manure.

The FLOAT WARE or FLOAT WRECK is a mixture of many things. It conſiſts in great part of the beforementioned ſea wreck or other ſea weeds, which the force of the waves tears from their place of growth; and with theſe are mixed every kind of refuſe matter that is found in the ſea; the gelatinous animals, called ſea nettles, and the like, many ſpungy ſea plants which are not tough like the wrack, but ſoft like jelly, and dead bodies of thoſe various creatures which the former naturaliſts did not know what to make of, and which Linnæus has taught us to call Zoophytes.

All theſe, and many more ſuch ſubſtances, are thrown up in high tides, and offered to the farmer on the ſpot as a manure. With theſe, in the weſt of England, they dreſs their very worſt lands, and make them fertile; and with theſe in Scotland, we hear by the late publications, they enrich their ſea coaſt land, which conſiſts like the beech itſelf to all appearance, of mere looſe pebbles, or of barren ſand. They get from both theſe kinds of miſerable ſoil, conſiderable crops by its aſſiſtance. They are ſo ſenſible of its value, that they lament their bad roads and inconveniences of carriage, which deny them the benefit of it in other places.

The value of the manure appears at firſt ſight. What can be more deſperate than the condition of abſolute ſand or a coat of pebbles; yet this the Scotch huſbandmen, by this ſole aſſiſtance, renders fruitful; and the land, which is ſo ſituated as to have this advantage, lets for twenty, thirty, or forty ſhillings the acre, which otherwiſe would not be worth ten ſhillings.

With us a few miles carriage may be very well worth while for ſuch a dreſſing; and it is fit the farmer ſhould know the right uſe of the manure and diſtinction of the two kinds.

The float wrack is the richeſt, but it is one of thoſe manures which is to be uſed for immediate ſervice, not for a laſting improvement of the ground; its particles, though very nouriſhing, are too light for continuance in the ſoil; and the ſun and air evaporate them in repeated plowings.

Therefore it would be idle to prepare land with this a long time before hand, for its beſt virtue would be loſt: it is not to be uſed like marle or chalk for mellowing the ground; but like ſoot, pigeons dung, and the others of the rich light manures, for giving an immediate ſtrength and vigour to the crops.

The beſt ſeaſon for laying it on is early in ſpring, before the rains that may waſh it into the ground; and while the ſun has not yet too much power.

This is the beſt ſeaſon for this kind, when the farmer has his choice, but that is not always the caſe. As the chance of tides brings it, he muſt take it when he can get it; and if it is offered in autumn or in winter, it will be very well worth his while to take it up and uſe it.

In ſummer alone he cannot make any great advantage from it. The crops are upon the ground, and at ſuch a growth, that he muſt damage them if he attempt to bring it on; and the ſun has ſo much power, that its virtue would be evaporated, not received into the ground.

The greateſt advantage of all that can be received from it, is by plowing it in before the ſowing of the ſpring crops. Let it be ſcattered regularly over a piece of ground that is to be ſown in ſpring, and plowed in as ſoon as ſpread: thus let it lie till the time of ſowing. The plowing for that purpoſe will blend it thoroughly with the ground, and the operations at that time will ſo mix the ſoil and the manure, that every part will have its virtue, and the land will be juſt impregnated with it fully when the ſeed ſhoots. The firſt roots of the young crop will receive its full influence; and the farmer will thus have all its virtue. It will laſt as long as the crop is growing; and it will be thoroughly exhauſted by that time. There will require a new quantity for another crop; but nature gives it him without care or preparation, and he needs not grudge the trouble of ſpreading and uſing it.

In ſome parts of Scotland the farmers call this INCOME WARE, from the manner of its being brought on ſhore: and they always obſerve that the ſpring dreſſing is the great advantage of it. If they meet with it in autumn they uſe it, but they find its virtue in great part waſted before ſpring: ſometimes they lay it on the ſeed-fur as they expreſs it: but in this caſe the good or bad conſequence depends upon the ſucceeding weather. If that be dry there comes more harm than good from it, for the abundant ſalt being all kept together, burns up the land: but if rains follow, this proves a very advantageous method of uſing it; for almoſt the whole is waſhed in, and the virtue is immediately communicated to the ſeeds.

Theſe are the chances of this manure, which the farmer can only get when nature throws it in his way; and he is to obſerve this particular quality of it, that he may judge where and on what occaſions to uſe it.

The lighter the land is the ſooner the virtue of this dreſſing is loſt. In the looſe, ſtony, and ſandy ſoils we have proved the advantage is only ſeen the year when it is uſed. In thoſe which are a little more firm, they ſee ſome good from it a ſecond year: and there are tough loamy grounds, which they call clayey, on which when they have laid on a large quantity of this INCOME WARE or FLOAT WRACK, they get three crops, and find very plainly the benefit of the manure in them all.

Their crops are bear, oats, and peaſe and beans, but probably, as the judicious author obſerves, they might have more advantage by leaving out the oat crop, and depending only on peaſe and beans, and bear, laying on the WARE for every ſecond crop of the pulſe.

CHAP. XXXIX.

Of the advantage of ſea wrack over dung.

THE farmers who live in the neighbourhood of great towns where dung is made in great abundance, find it ſo convenient and ready a manure, that they think of no other: but to underſtand the value of thoſe ſeveral kinds we have propoſed to be occaſionally uſed, the greater part of which are at leaſt of equal value with dung, they ſhould conſider, and compare their ſeveral properties as they are laid down here; or as they will hear them related by ſuch as have ſeen them uſed; or beſt of by all thoſe who have uſed them. With regard to the preſent ſubject the ſea wrack manure, wherever it can be had, let it not be rejected for dung, for experience ſhews that it is better: and even where the land lies at ſome diſtance from the ſea, it may be worth while to carry it: for in this caſe the picking up and carriage are the whole expence; and the Scotch farmers, who have tried both, aſſert that one load of it goes as far as two of dung. Beſide the uſe and manner of applying it which we have named, it would probably be of great uſe on ſomewhat firm lands in the ſummer fallows; but then it muſt be plowed in immediately.

We name only the probability of this ſucceſs, becauſe there has not been a fair trial. In Scotland, whence we have moſt knowledge of this manure, they have no ſuch practice as ſummer fallowing; and in England, where I have ſeen this tried lately with no advantage, the ſoil was ſandy, and the manure was ſuffered to be in heaps three weeks upon the land before it was plowed in; the ill ſucceſs therefore was owing to the farmer's bad management, not to any defect in the nature of the manure. I ſaw the whole progreſs of this trial, and muſt acknowledge no good nor harm came of it: but if the dreſſing had been given in a proper manner, there is reaſon to believe it would have ſucceeded very well.

The common practice of the Scotch farmers is to uſe this manure alone; but we have found from experience, that the mixture of many kinds in form of compoſt gives them great additional force: and there is no reaſon this ſhould not ſucceed in the ſame manner.

The very beſt method of uſing it in mixture would be with only paſture mould. It would put this into a ſtate of fermentation, and by that means would more readily impregnate the land when laid upon it.

We have obſerved that the beſt time of uſing this is ſpring; but nature often denies it, at leaſt does not offer it in any quantity at that time; and on the other hand affords it in vaſt abundance at ſeaſons when it is leſs proper to uſe it.

On theſe occaſions it will be highly advantageous, to mix it with mould into a compoſt, and thus keep it all the time improving in its qualities till the proper ſeaſon to lay it on the ground.

Thus ſuppoſe in a winter's ſtorm, a great quantity of this INCOME WARE is waſhed on ſhore. Let the farmer chuſe a ſpot as near the place as he can, but perfectly out of reach of the tides.

Let him pare away the turff, and dig out a quantity of the mould one or two ſpades depth according to the ſoil. Let him throw out this mould to the ſides of the hole, and lay the turff alſo ready. Let him lay in one half of the turff bottom upwards in the hole, and throw upon this a third part of the ware. Then let him throw in ſome of the mould to cover it: over this let him throw in more of the ware, and then more mould; and thus filling up the hole with a coat of one and a coat of the other; and throwing in at various times the remainder of the turff, let him make up the whole into a ridge at the top covering it five inches deep with mould.

Thus let it lie till the ſeaſon comes of uſing it. The turff will rot, the ſea weeds will alſo be entirely diſſolved, and the whole will be a maſs of moſt rich and excellent compoſt. This may be laid on the land in ſpring; or at any ſeaſon when the farmer finds it moſt requiſite and moſt convenient. In this condition it will mix more freely and perfectly with the ſoil than in any other; and being itſelf in a ſtate of fermentation, it will communicate the ſame quality to the land in a very effectual as well as ſpeedy manner.

CHAP. XL.

Of the uſe of ROCK WARE.

WE have hitherto ſpoke principally of the *float* or *income ware*, as it is the moſt valuable for immediate ſervice; but the qualities of the *rock ware* being more laſting in the ground, that alſo deſerves great regard.

As this may be had at any time, the farmer ſhould ſuit that to the laying it on the ground.

The very beſt ſeaſon for this is autumn: the weed itſelf is in very good condition at that time of the year; and if it be then laid on and plowed in, the ground will be all the winter mellowing with it; and in ſpring will be fit for ſowing with the full ſtrength of this manure in it.

The beſt method is, juſt before the autumn plowing, to have a ſufficient quantity torn from the rocks. Let it be ſpread over the ground, and immediately plowed in. The ſalt which it contains will thus mix with the lower part of the ſoil; and the weed itſelf will by degrees decay. Every plowing will tear it more and more to pieces, and mix it better and better with the mould; till by the ſpring ſeed time there will be no large pieces of it left in the ground; and the whole ſoil will be mellow, rich and fine.

The crops of that year will ſhew the value of this kind of manure; and according to the quality of the ſoil it will continue fertile from it two or three years afterwards.

There is another value in this manure, with which the farmer ſhould not be unacquainted, that he may know in what manner to uſe it, if nature throws it in his way at a time when he has no occaſion for it upon his land. This is the good effect it takes in kitchen and fruit gardens.

Experience ſhews that in theſe articles it is inferior to few manures if it be to any; and we have told the huſbandman, that many of the common products of the garden may be raiſed with great profit in fields. He knows alſo that it is his intereſt to have an orchard; and in both theſe caſes this kind of manure will be very ſerviceable.

He muſt have a kitchen garden for his family, and when that article is well managed, and many mouths are to be fed, it is no ſmall conſideration: but when we extend the view to the kitchen products raiſed in fields, it is of great importance.

Whether it be in the field or garden, this *wrack* is to be uſed, the manner of applying it muſt be according to the occaſion and the nature of the thing itſelf. We know that the *float ware* gives its virtue moſt freely, and the *rock ware* is moſt durable in the ſoil.

Therefore if a piece of poor ground be dug up for a new kitchen garden, or ſuch a field be plowed with an intent of the like produce, the rock ware muſt be choſen, and it muſt be buried in the ground; and afterwards take its chance in the ſucceeding diggings and plowings to be thrown up again, and mixt with the ſoil.

It will thus by degrees work among the mould, in ſome meaſure as that we directed to be buried for a compoſt; and the whole body of the ſoil will become mellow and fertile; and will retain thoſe qualities many years.

On the other hand, if the farmer have a garden crop growing which wants aſſiſtance; ſuppoſing it to be peaſe or beans, or other ſuch where there is diſtance between the rows for digging, the method muſt be to ſpread a quantity of the *float wrack* upon the ground in theſe intervals, and immediately dig it in. The advantage of this will be prodigious, the crop will be double in quantity, and more than twice as good in kind.

In the ſame manner where there can be the opportunity of giving this dreſſing to a crop while growing in the field, the benefit will be the ſame, but this is limited to the horſehoeing huſbandry. In the common practice, if the farmer finds his crops decaying during the time of their growth, he can do nothing to help it; but in the horſehoeing method, as there are large intervals, it is eaſy to ſtrew a quantity of this manure over them, and to plow it in. The advantage will be the very ſame that is ſeen in the garden crop: the plants which had appeared faded and yellow will recover their ſtrength and colour, and the corn in the ear will mellow and fill as if the ground had been covered with an expenſive dreſſing at the more regular time.

In orchards the advantage is as great from this dreſſing as on any other occaſion. Mr. Scot, to whom we owe ſo many excellent inſtructions relating to the uſe of this manure, ſays, that he has ſeen trees which were perfectly barren, become very fruitful, only by laying a quantity of it about their roots.

This fact, as eſtabliſhed upon ſo good authority, is of great importance in gardening; for there is nothing more difficult than to bring a tree which has become barren into a condition of ſervice.

There may be different ways of uſing it for this purpoſe, but the beſt is to take it in time, and provide for more than the fertility of one ſeaſon.

If at any time it appear that a tree is likely not to ripen the quantity of fruit that is on it, and which is no more than it might be reaſonably expected to afford, the method will be to lay a quantity of the float wrack round the ſtem of the tree, to cover it with a little mould, and every other day to water it pretty plentifully. The mould which covers it will prevent the ſun from exhaling its virtues; and the frequent waterings will waſh in its beſt parts to the roots. Plants are fed by water more than many are aware; and it is a great article at ſuch a time to give them a water richly impregnated.

This method will ſhew its good effects more than in the year wherein it is done, the two or three ſucceeding ſeaſons will have ſome advantage from it: but to go to work in the moſt perfect manner, the winter ſhould be the time of laying in the manure, and it ſhould be dug into the ground about the roots of the trees.

For this purpoſe the beſt is a mixture of the rock and float wrack, and theſe ſhould be laid upon a coat of good mould a foot thick, and covered with a foot depth more of the ſame mould. Thus the whole is to lie in a heap, two or three months. Then the earth ſhould be carefully dug at a diſtance from the ſtem of the tree all round, and a good quantity of this manure worked in and covered up with more of the mould. After this three inches thickneſs of it ſhould be ſprinkled over the earth near the ſtem of the tree, and this ſhould be dug in with a three pronged fork. Thus a laſting fertility will be given.

CHAP. XLI.

Of bringing waſte land into tillage by potatoes.

EVERY improvement of huſbandry demands our regard from its plain and univerſal utility; but thoſe articles moſt of all, which tend to bring waſte or neglected land into uſe; for they in a manner add ſo much to the kingdom, and the quantity of ſuch land that lies neglected at preſent in England, calls for all our acknowledgments to thoſe who ſhall propoſe methods of rendering it uſeful.

The method by potatoes is not the leaſt. We owe it to Mr. Wilſon, a perſon of a perſuaſion which carries with it the character of gravity and truth; and reaſon countenances what he aſſerts upon the ſubject.

The improvement is not limited to any one kind of land; but wet or dry pieces of ground are equally capable of it; ſo much regard being ſhewn to their nature as to chuſe a proper and ſuitable kind of potatoe.

In theſe ground drains muſt be cut to carry off the abundant moiſture, and they are then brought to the ſame ſtate in reſpect of this culture with the others.

In wet grounds the firſt planting muſt be made with the ſpade, but afterwards the plow will anſwer the purpoſe; and the potatoes, while they afford a valuable crop upon a land almoſt uſeleſs, will all the while be improving it for other purpoſes: ſo that after ſome time it will be brought to the condition of what was naturally richer land; and the proper kinds will thrive very well upon new drained bogs, even where cattle cannot be brought in to plow the ground, becauſe of its ſoftneſs.

Mr. Wilſon, who propoſes this improvement, gives a very ſingular inſtance of its good ſucceſs. He tried this management upon a piece of wet ground not worth ſixpence an acre, and had tenfold increaſe two years ſucceſſively; and the third year without any aſſiſtance of manure, the land yielded as good a crop of garden beans as were to be ſeen any where; and the land after this continued equal to the beſt in the neighbourhood.

Even in abſolute bogs, when drained for this purpoſe, the planting and management of the potatoe ſo perfectly divides and improves the ſoil, that it will bear grain and graſs very well, and in the end become good meadow land.

The frequent digging that is neceſſary in raiſing this kind of crop is a vaſt advantage to the ground; and the haulm of the potatoes, which is large and plentiful, rotting in the land, adds the benefit of a manure. The roots themſelves raiſe and mellow the earth; and notwithſtanding their large ſize, and great increaſe, they exhauſt it very little.

There are two kinds of potatoe which thrive beſt in boggy grounds, one the long, white, and the other what is called the blue potatoe; and theſe are both very good kinds. Mr. Maxwell obſerves, that when a piece of heath ground is once prepared for theſe, three crops of potatoes, and three of grain may be had from it without more charge than the common labour.

The third year's fallowing may be ſaved by planting of potatoes with the plow; and no crop loſt. The ſame quantity of dung in this caſe anſwers the purpoſe, and the year's produce of potatoes will be more valuable than if corn had been ſown; and the ground improved more than by a fallow. Theſe are conſiderations of a large extent, and may be the ſource of a great deal of advantage, under proper management, not only to the huſbandman who puts them in practice, but to the kingdom.

CHAP. XLII.

Of burning the turffs on wet and waſte land.

THE advantage of burning the turff or ſurface of the ground in barren land is known ſufficiently, and we have in treating of this article under the head of burnbaiting, given the methods by which the common diſadvantage attending this practice may be removed. This ill conſequence is the exhauſting of the ground in a very peculiar manner after certain crops; but it may be prevented by timely aſſiſtance from manures.

The inconvenience and difficulty of burning the ſtuff, occaſions many to neglect this uſeful practice; but there is an improvement upon the common method of doing it in the memoirs of the Scotch ſociety, which may deſerve attention.

The ſuperficial coat of the earth is the proper ſubject for this burning, and in whatever manner or on whatever occaſion it has been taken off, the ſame method may be uſed in reducing it by fire to a proper condition for manure.

Uſually this is done upon the ſpot, and there is certainly great advantage in that: and in what is called burnbaiting, the upper coat of the ground is pared off for that purpoſe. But when any accident offers the coat of ſome part of the ground for this ſervice, it ſhould never be neglected. In digging ditches or ponds, the firſt ſpade's depth will excellently anſwer the end; and when ant-hills or mole-hills covered with graſs come in the way, they ſhould always be employed for the ſame ſervice. Whichever of theſe things is to be burnt, firſt let it be well dried: then dig four channels half a foot deep, and of the ſame breadth, and let them be thirty foot long. They muſt interſect one another in the middle, and there let them join.

Theſe channels ſhould be covered over with bricks or tiles all the way, except in the middle where they join.

In this part it will be proper to erect a chimney made of four bricks, and continued up to the height of nine foot.

As this will be a very tottering building, let it be ſupported by a parcel of turffs laid all round it up to the height of eight foot. Round about this turff ſet five and twenty good faggots upright; and lay upon theſe a little cord wood.

This muſt not reach ſo high as the top of the chimney.

From theſe faggots piled round the turffing of the chimney lay four others, one upon each of the channels; and in the ſame courſe with the channels.

This being done, bring in a good quantity of the turff, and lay it upon and about the faggots which lie lengthwiſe on the flues till they are covered; and heap up more till the cord wood is covered two foot thick.

When the heap is thus raiſed, care muſt be taken to ſtop up all holes and crevices that ſhall be ſeen in it: for the fire is not to have any vent except at the chimney. Nothing more is required for ſtopping theſe but to lay on pieces of freſh turff; but this muſt be done with care wherever there is occaſion.

The heap being thus prepared and finiſhed, the faggots on the flues or channels are to be ſet on fire, at that part where the wind will beſt carry the flame through the whole.

Therefore, whichever way the wind ſits, let the fire be given in that flue which faces it: but let all the reſt be kept open and clear to aſſiſt the draught of air.

The fire muſt be watched during the whole day, that it keeps within bounds; and that it have proper matter thrown upon it.

In half an hour the top of the heap will begin to ſink; and the fire will burſt through many cracks made by that ſhrinking; but this muſt be prevented by laying on freſh turffs, and making up the heap; and at the ſame time clapping on ſome any where that the fire ſhews itſelf through the ſides.

The quantity will diminiſh very faſt, and from time to time it muſt be ſupplied; till all is thrown on.

This will extend it in circumference at the bottom; and as it ſpreads beyond that part of the channels that is covered, they muſt be covered farther; for this keeps up the draught of air. The chimney muſt alſo be kept all the time a foot above the heap.

If the matter burns more fiercely at the top than elſewhere, as is often the caſe, ſome openings muſt be made in the ſides near the bottom: when it burns leaſt in any particular part, ſtop up the channel that is neareſt that part, and let it remain ſo till it be as well on fire there as any where elſe, and then open it again.

If the weather be tolerably favourable, the whole quantity of turff will in this manner be burnt to a fine, rich, and ſtrongly ſaline aſh: but if violent rains fall, there muſt be all poſſible care taken to preſerve the calcining matter; as well as to keep the fire burning. The beſt method is to pile on freſh turff in ſo large a quantity, as to keep out the wet; and to repeat and renew this as the fire within burns it away underneath.

By this means a vaſt quantity of turff will be burnt in a ſmall time; and if there be a demand for more than uſual, two or three ſuch heaps as theſe may be made up at once, and one perſon can attend them. The aſhes they produce are an excellent manure; and experience ſhews, that when theſe aſhes are made by burning ſuch great quantities together, they are ſtronger and better than thoſe made in the common way of burnbaiting, by piling up the ſtuff in little heaps.

It is equally excellent as a manure for corn and paſture ground. When it is uſed for land in tillage, the proper time of laying it on is juſt before the laſt plowing up of the ground for ſeed: on paſture ground it may either be laid on in autumn or ſpring; but the beſt time is in ſpring a little before the firſt ſhooting of the graſs; in this caſe its advantage is equally ſeen in the preſent and the ſucceeding years; and beſide the firſt great ſhew of ſucceſs it is very laſting.

The way of laying it on paſture ground is to ſpread it from the cart; a perſon ſtanding in the cart with a ſhovel for that purpoſe. When it is thus laid tolerably even, the lumps muſt be broke by a labourer going over the ground with a ſpade, and after this it muſt be rolled twice over with a heavy roller.

The rains that follow will waſh it perfectly into the ground, and it will at the ſame time prevent the growth of moſs, which is the worſt enemy to graſs land, and promote that of graſs; and particularly of the white clover. The quantity at a medium ſhould be ſixty loads to an acre.

CHAP. XLIII.

Of flax.

THE perfection of the ſeed of flax is a great article, and it appears from the obſervations of a curious perſon on the ſpot in Holland, that it is not the common looſe ſoil of that country which produces fine ſeed from the plant, but the ſtiff and clayey ſoils, which they till with a particular care and labour for this purpoſe, in ſome peculiar places. The Dublin ſociety firſt publiſhed theſe obſervations, and they deſerve to be commemorated in all ſucceeding inſtructions for huſbandry.

In the province of Zealand they raiſe flax ſeed to perfection, and not in the common looſe land of Holland. The Dutch ſupply great part of Europe with this ſeed; and as they know the trade depends upon their fidelity in ſelling only what is good, they never offer any at market but what is the produce of theſe ſoils at home; or what is firſt imported by them from other kingdoms where a ſeed of like quality is produced; probably by the ſame means, it having grown on a well cultivated ſoil of that ſtrong kind.

Theſe firm and tough ſoils not only produce the moſt perfect ſeed of flax, but when ſown for the common produce of the ſtalks, they afford them larger, and more in quantity than the light and dry lands: but the flax is ſomewhat inferior in quality.

The farmer who intends to raiſe flax, will therefore conſider the nature of his ground, and the demand for the commodity, and he will ſow accordingly; for very fine flax upon light ground, and for perfect ſeed upon ſtiff ſoils; for the ſtalk upon ſuch land as is dry, and for the ſeed upon ſuch as has more moiſture. But in all this there muſt be diſcretion: abſolute wet clay will not anſwer the purpoſe for ſeed; nor will poor and barren ſandy land yield crops of the ſtalk worth gathering. There is a medium to be regarded in all things, and no ſucceſs can be expected without it. The firm lands are fitteſt for one of theſe purpoſes, and the light for the other, but there are degrees in the compoſition of ſoils: and for the purpoſe of ſeed a very firm loam is better than abſolute clay; as for the common growth a land ſomewhat lighter than this, but not approaching to abſolute ſand.

The more tough the ſoil is, the more working it will require; and he who ſpares this will defraud himſelf ten fold. With regard to manures the Dutch uſe principally three, horſe dung, aſhes, and human excrements. This laſt is a very offenſive article; but in the dreſſing land for a produce that is not for food, it may be allowed; and in ſome ſmall trials which have been made in England, it has been found excellent. There have been farmers who have uſed it for corn land; but the thought is moſt deteſtable. The uſe of it, if limited to crops not intended for food, may be well worth conſideration; and for this plant and for hemp it will anſwer excellently.

The quantity that may be had is very great, and at preſent it is worſe than uſeleſs to the publick. There is an expence in carrying it away, and wherever it is laid it is offenſive. In this caſe it would be converted to a very uſeful ſubſtance, and there is none who doubts its richneſs when properly uſed.

The methods which have been propoſed by others have not anſwered to expectation: for the way in which it is leaſt offenſive, and beſt conveys its virtue to the ſoil, is mixing it firſt with earth and aſhes. This is the method wherein it has ſucceeded in the trials made in England; and there is no reaſon to doubt, but it will in the ſame manner anſwer in larger works. The ſucceſs of the Dutch, who we are aſſured by the obſervations before mentioned, uſe this manure, ſhould encourage us to the trial, and the huſbandman will find few crops more profitable.

CHAP. XLIV.

The method of uſing human excrement as a manure for flax.

DIG a pit in the ground three foot deep, and thirty foot broad, in length proportioned to the quantity of the manure that is wanted, or that can be obtained. Mix together one load of common coal aſhes, and three of mould, from a dry and ſharp loamy paſture: if the earth of the place be of that kind it will ſave trouble, becauſe the pit may be only dug two foot deep, and then its bottom broke up, and the mould well divided for a foot depth more. In this caſe the aſhes ſhould be ſpread carefully over the ſurface when the pit is cleared out to two foot depth; otherwiſe ſuch a quantity of the mixture made of three parts mould and one part aſhes, muſt be provided as will cover the bottom of the pit a foot deep. There is a neceſſity of the mould being loamy, that is, that it muſt contain ſome clay and ſome ſand as well as vegetable earth, that the excrement may be well divided and fermented with it.

When this is ready, bring in a quantity of excrement from the emptying of common bog houſes, equal to the mould and aſhes; and let it run in among that looſe matter. As it will naturally be brought in carts, the beſt way is to order it to be turned in at different parts of the pit. Let it be covered with a light coat of the ſame kind of mould: three or four inches thickneſs is ſufficient. This will be moiſtened by the matter underneath, and with the heat of the ſun will dry into a kind of cruſt. When the whole is ſo far hardened that it can be dug up, let this be done with care. Let it be turned and well broke with the ſpade, and after lying a little time longer covered with a freſh cruſt of mould, it will be in perfect condition to throw upon the land before the laſt plowing. This muſt be done regularly, and a labourer muſt follow the cart to ſpread it well, and then the ſooner it is plowed in the better. The ſeed being ſown ſoon after this, will fall into the ſoil at the time when it is moſt influenced by this manure, and is in a good condition to receive it. The fermentation which is thus made in the ground, will continue during the firſt growth of the plants in great ſtrength, and it will only be leſs as it is leſs wanted.

The ſtiff ſoil, which is moſt profitable for flax, will be rendered warm by this manure, and its natural coldneſs being conquered by this dreſſing, while its proper firmneſs for holding the roots remains, both the ſtalk and the ſeed will ripen in perfection.

This is an aſſiſtance, by means of which the flax of Britain may be brought to rival that of all the kingdoms in the earth; for there is none better calculated by nature for its production.

CHAP. XLV.

Of other manures for flax.

AS the ſoil will, from its nature, ſuit the other principal manures, as lime and marle, theſe may be uſed. With regard to common dung, it ſhould never be laid on till well rotted; and it is much better in compoſt, than any other way. The ſea wrack is alſo a very good manure for flax land; and in general, any thing that has a ſmall quantity of ſea ſalt in it. When a dry and hard manure is wanting, as in caſe of too damp a ſoil, as well as too tough, that ſort of ſea ſand which is made up of fragments of ſhells, is very proper. Dung ſhould be avoided, where other manures can be procured; becauſe every one knows that dunged lands are more ſubject to weeds than others; and there is no crop that ſuffers more by weeds than flax. They not only exhauſt its nouriſhment, but keep it from the free acceſs of the air on all parts, on which depends, in a very great meaſure, the perfection, toughneſs, and colour of the threads.

The fineneſs of the ſoil is the next conſideration; and this is ſo eſſential, that in Zealand they raiſe flax after ſucceſſive crops of corn and madder; in the preparation for which crops, and management of the laſt while growing, the ſoil is ſure to be brought into an excellent degree of fineneſs. This is a moſt eſſential article; that with common refreſhments of manures, they find ſuch land ſupport the crop of flax, even after all this waſte of nouriſhment, better than the freſheſt ſoil uſually would, if leſs reduced by tillage. The nature of the land they employ for this ſervice, alſo makes long tillage more than ordinarily needful; for it is of the clayey kind, as we have obſerved before, and ſubject to wet. Now there is no ſoil ſo ſtubborn as clay: nor is that ever ſo perfectly ſo, as when it is wet withal. The digging for the madder gives a kind of tillage, that field land rarely has on any other occaſion; and this perfects what the dreſſing for corn had begun: our farmers know the advantage of bringing in one crop after another, upon many occaſions; but there is none in which it anſwers ſo well as this.

If the land be not very well in heart at the beginning of this courſe, it is impoſſible the whole ſhould be well ſupported; but the field being brought into a condition ſuited to the expectation of the number of crops, and kept up in it by good dreſſing during their growth, becomes thus a ſource of great and repeated advantage to the huſbandman.

Indeed as flax naturally and happily follows madder, it were extreamly to be wiſhed, that in England our farmers would ſee the propoſal in its full extent, and undertake both together. There is no doubt of our being able to propagate madder as well as flax; and that with the ſame attention and induſtry, we may do it as well in England, as we ſee it done in Flanders. The ſpirit of improvement is on foot, and this root is one of the articles which is propoſed for an inſtance: the ſecond conſideration of raiſing flax after it, is by no means to be ſlighted; and there will be no danger of ſucceſs, if the proper methods are followed.

There is no way by which madder can be brought to ſo great perfection, as by the horſehoeing huſbandry; and in this method there is no danger of over draining the ground. The intervals of the plantation which are from time to time plowed up, are thus kept in a ſtate of fallow; and when the madder is taken out of the ground, the ſoil will be in an excellent condition to prepare for flax; not only becauſe the intervals which form the great part will be unexhauſted, but the whole ſoil will be broken, and reduced to that fineneſs which the flax requires, much better than by any other way of dreſſing.

If the farmer will attend rightly to this method, and undertake it with ſpirit and diſcretion, his ſucceſs is certain; and the advantage will be much greater than can be obtained any other way. The ſame tough ſoil when duly prepared, is excellent for wheat as well as flax; and ſome tillage that will be uſeful to the one purpoſe, prepares it alſo for the other.

We recommend the horſehoeing huſbandry; but we do not, in the manner of Mr. Tull, adviſe the farmer to depend upon that only, and to exclude all manure.

When he has pitched upon a proper field, let him enrich it, by a moderate addition of ſuch manures as we have directed; and though we adviſe ſome, let him not ſuppoſe we direct him to lay on as much, as if only the common tillage were to follow. The horſehoeing method will make leſs anſwer; but that ſmaller quantity ſhould not be denied.

When the ground is thus brought into a condition for the long ſervice it is to do him, let the wheat be ſown by the drill plow in October, and the crop aſſiſted by frequent tillage of the intervals, till the time when the corn is full in the ear.

Thus will the ſoil be very well broke: and the wheat crop being taken off, let a ſecond be raiſed, by drilling in the centre of the intervals. This will ſucceed as the firſt; and thus no time will be loſt, for it may be ſown as ſoon as the harveſt is in. Theſe intervals having been, all the time the other crop was growing, kept in a continual ſtate of tillage.

The places where the rows of wheat ſtood, will now be the intervals: they muſt be wrought by the horſehoe in the ſame manner as the others were: the crop will be thus ſupported, as the firſt; and when it is taken off, the ground will be all of it in a ſtate of thorough tillage, the different parts having been well wrought in theſe ſucceſſive growths.

A ſlight addition of manure will now prepare it for the madder; and that crop being in the ſame manner planted at diſtances for horſehoeing, the ſame conſequence will follow, that all the while it is taking its growth, the greater part of the land, that is, the whole extent of the intervals will be preparing for the flax by the repeated plowings.

The madder being taken up, the flax ſhould come on with another ſlight addition of manure; and thus all the crops will be well ſupported, and after the laſt of them, the ground will be in a condition to be very eaſily refreſhed by new dreſſing, for the reception of the ſame things in courſe again; or of different crops.

In thoſe parts of Flanders where they do not deal in madder, they allow a very fine dreſſing for the land intended for their flax: they give it the advantage of a ſummer fallow; and for preparing it to receive the ſeed, they allow three plowings. The time and labour they beſtow on this crop is very well repaid, by the abundance and excellence of the commodity. This is a leſſon we have often attempted to inculcate into the Engliſh farmer; and he may depend upon its ſucceſs. There is indeed no bounds that need be ſet to the aſſiſtance it is poſſible to give a crop: for there is no expence it will not repay. We do not ſpeak of flax alone, but of all kinds of the farmer's plantation. The ſame piece of ground with better management will produce richer and richer crops, almoſt without limitation; and half the ill ſucceſs our people meet with in their attempts to raiſe crops which ſucceed ſo well with their neighbours, is owing to their not allowing the ſame care and labour.

It is common to ſow flax in Ireland upon one plowing on ley grounds; and it is no wonder the return is but moderate. We have ſaid, that flax ſeed requires a ſoil perfectly well broke and tilled; and the moderate crops of it produced on land ſo imperfectly prepared for the ſeed, are proofs that the ſame ground, with due tillage, would have yielded very fine ones. This is the great conſideration in all new ſubjects: we allow them leſs care than the old; and by this means we get inferior crops: reaſon dictates a conduct exactly contrary, and by obeying her, we ſhould reap the proper advantages.

CHAP. XLVI.

Of the Flemiſh management of their wet clay.

THE Flemiſh huſbandry, with regard to the growth of flax, cannot be too exactly copied in England: for it is owing to their management of the land, not to any thing in the land itſelf, that they obtain thoſe excellent crops of flax, which make them the envy of their neighbours. Their land in general, on which they raiſe this plant ſo ſucceſsfully, is tough and clayey, and is too much ſubject to moiſture. They manage this in a way we ſhould, on many occaſions, be very wiſe to copy. They lay it out in broad ridges, ſixty feet or more in breadth, and they ſeparate theſe by trenches of two or three feet deep, and half a yard wide, according to the nature of the ſoil. This ſerves at once to drain off ſuperfluous wet, and to keep as much as is neceſſary for the good growth of the crop. The breadth of the land preventing its drying too ſoon, and the depth of the trenches taking off all redundance of moiſture.

Flax never ſucceeds, unleſs there be a due quantity of moiſture detained about its roots. It is for this reaſon principally, that tough ſoils raiſe the ſtrongeſt crops of this plant, becauſe they always detain ſome wet: and the Flemiſh huſbandmen ſo well underſtand the neceſſity of this, that whenever

ever they ſow fields of a lighter ſoil with flax, they lay the whole ground flat and level, and make no trenches, that all the wet which falls may be received upon the ſurface, and detained there, without paſſage out by theſe trenches, which in too wet land ſerve abſolutely as ſo many drains.

The ſeed for a crop of flax cannot be too carefully examined. The methods of the Dutch by which they judge of the ſeed, ſhould be carefully obſerved alſo by the Engliſh farmer. In order to examine the thickneſs of the ſeed, let the farmer take up a handful and ſqueeze it: there will be numbers of the ſeeds force themſelves out between his fingers edgeways; and it is by the edges the thickneſs of the ſeed is to be examined: if theſe be ſharp and thin, the ſeed is alſo thin and poor: if they be rounded and plump, the whole ſeed is of the ſame quality. They muſt alſo be firm and ſmooth; for if the edges of the flax ſeed be rough, ragged, or broken, the ſeed is damaged; ſo much of the ſucceſs of the crop depends upon the perfection of the ſeed, that too much care cannot be taken in this and the other methods of examination.

If the ſeed anſwer in this point, throw a parcel of it into ſome water: the ſooner it ſinks the better it is. This is a true and certain way of judging of the weight; and no flax ſeed can be good, that is not heavy.

Another quality of the ſeed is, that it ſhould be very oily. When flax ſeed is in perfection, it burns brightly and violently in the fire, and crackles all the time. When it is poor, it conſumes in the manner of chaff. This furniſhes the Flemiſh huſbandman with another method of judging of the ſeed; he never fails to try it by all theſe, by his touch, and by his eye; by water, and by fire: and if it anſwers to all, he is ſecure. If there be any doubt, he ſows ſome of it on a hot bed, and by this learns at once in what degree it poſſeſſes the power of vegetation. In all theſe trials there is very little trouble; and if there were much more, it would be very well worth the while, in order to avoid ſo great a diſappointment as the loſs of a crop, by the irreparable fault in the ſeed.

If this caution be neceſſary to the people who conſtantly deal in flax, and are by long cuſtom acquainted with all the particulars of the ſeed by ſight, it muſt be much more needful to us, who have not yet that acquaintance with it.

The change of ſeed which we have had occaſion to recommend on many other occaſions, is in no article more neceſſary, than with regard to flax; and the great benefit will depend upon the farmer's changing with ſome diſtant acquaintance, whoſe crop of flax has ſtood upon a piece of ground, in ſome meaſure different from his own; and in a different ſituation and aſpect. The thing is not ſo well underſtood as it is known, that all crops ſucceed the better for the ſeed being brought from a different ground: and it is plainly ſo in flax. No ſoil, which has not a ſufficient firmneſs, can raiſe the flax to a ſtate of perfection: therefore no other can produce good ſeed. This is to be the farmer's firſt object, in the procuring ſeed by exchange; but he will find that ſo long as there be a due toughneſs in the ſoil, where the plant has grown, the ſeed will ſucceed beſt on clay, that has been raiſed upon a loam, and that will do beſt on loam which has been raiſed on clay: and as the ſituation and aſpect of fields where flax is ſown, is an article not at all regarded, he may eaſily obtain the ſeed from a field open to a different quarter of the heavens from his own, and probably this will be a great advantage. I ſay probably, for the fact has not, that I know, been tried in this inſtance; but what ſucceeds in one plant, is likely to have the ſame effect on others: and I have found in gardening, that the obtaining ſeed from a piece of ground, with a different aſpect, has been of great benefit.

The change of ſeeds is an article of more conſequence than is imagined, in the raiſing of flowers to their higheſt perfection; and this particular promotes it greatly. The field is only a garden of more extent; and whatever is uſeful in one, will be ſo in another inſtance. The more the culture of the field is brought to be like that of the garden, the more it will give ſtrength and perfection to the crop.

The more difference there is between the ſoil, ſituation, and other circumſtances of the land where the flax grew which produced the ſeed, and that whereon it is ſown, ſuppoſing both to be within the limits of what we have deſcribed as proper ſoil for this plant, the more expectation there may naturally be indulged that the crop will be good; therefore the obtaining the ſeed from other parts of the ſame country, is preferable to the common method of procuring it from abroad; becauſe, in this caſe, the farmer can be ſure that he has it from a land of contrary qualities, thus far from his own, which he cannot poſſibly know, when he has it from abroad.

The lighter the ſoil is, the more apt is the flax ſeed to degenerate; but it has been proved by fair trials in Ireland, that when this ſeed has been reduced to a very poor ſtate, by ſowing year after year on light land; it will recover greatly on being ſown on clayey ſoils. We have ſaid, that theſe require great tillage, without that they are perfectly unfit; but under the management we have directed, they will afford a large crop of flax, and perfect the ſeed.

The purpoſes of the farmer who raiſes flax are two: the obtaining the immediate and intended produce of the ſtalk, and the ſeed. Theſe may be conſidered ſeparately, in regard to the quantity of ſeed to be ſown; for, in general, the fewer the plants the better will be the ſeed: therefore, where this is a material conſideration, care ſhould be taken accordingly; and this is a very eſſential article, while we are endeavouring to raiſe our own ſeed to ſuch perfection, as not to need foreign purchaſe.

The time of ſowing is a great article in reſpect of the future working of the ſtalks. There requires ſummer weather for the doing this well; and the earlier in ſpring the ſeed is put into the ground, the more chance there is of this advantage; for ſo much the ſooner the flax will be ripe.

There is alſo this farther benefit to the farmer, that when he gets his flax crop early off the ground, he may have a crop of turneps directly after it. There is a great deal of difference between making this ſecond profit of the ground and letting it lie idle: and experience ſhews that turneps thrive very well after flax; and the getting two crops inſtead of one, is an advantage of no mean conſideration.

Another very uſeful crop there is which ſucceeds extreamly well with flax: this is clover. The farmer who intends to lay down his land after the crop of flax, cannot do better than by ſowing clover a few days after the flax is in the ground. They grow together without the leaſt prejudice to each other; and by that time the flax is in a condition to be pulled, the clover will be of great ſtrength and a fine appearance.

The flax is ſo far from receiving any damage from this, that on the contrary the clover ſeems an advantage to it. It is not difficult to explain this: there are many plants which grow naturally in paſtures, which no art can raiſe in gardens; and the reaſon is, that the graſs is a ſhelter to their roots, and by its continual ſhade mellows the ground, as well as keeps it moiſt by detaining the dews. Clover does ſomething like this, and flax is one of thoſe plants which naturally receive advantage from it. In this caſe the two crops take their growth together, and one is ready for ſervice when the other is removed out of the ground. The clover alſo prevents thoſe tall weeds which are found ſo detrimental to crops of flax.

When flax and clover are ſown together, the article of weeding is ſaved, becauſe theſe crops will ſuffer no weed to live among them: in other caſes the field muſt be carefully weeded. This is beſt done when the flax is about a finger's length out of the ground; and the weeders muſt take care not to tread the young crop into the ground: for the plants rarely recover this. The weeding without ſhoes has been found a great article of ſecurity to the crop: the Iriſh as well as Dutch, have found, that if the weeders ſat down upon the flax, the plants recovered the bruiſing; but not if they were trampled into the ground by the heels of their ſhoes. The going without ſhoes takes off the danger, for the ſoft and flat foot does as little harm as the ſitting upon the plants.

This muſt be done with caution on the part of the weeders not to endanger their own health. People uſed to the inclemencies of the ſeaſons in their courſe of employment ſuffer leſs from them than ſuch as are bred more delicately; but there are outrages upon the conſtitution which affect all. The proper perſons for weeding without ſhoes are thoſe who have accuſtomed themſelves to go without them on other occaſions; and Ireland affords many ſuch, nor are they wanting in ſome parts of England.

CHAP. XLVII.

Of the time of pulling flax.

THERE is no article of ſo great importance in a crop whoſe value depends upon the ſtrength of the fibres in the ſtalk, as the time of gathering it: this is very much miſunderſtood, and there are thoſe who run into extreams on each ſide. The Iriſh often pull it too ſoon; and notwithſtanding the high opinion we entertain of the Flemiſh huſbandry in this reſpect, they uſually let it ſtand too long.

The farmer ſhould underſtand ſomething of the courſe of vegetation, to be a true judge in this reſpect.

All plants, when they have perfected their ſeed, die down to the ground; and the annuals entirely. Flax is of this latter number, and when the plant has perfected its ſeed, the root decays, and conſequently the ſtalk dries.

If flax were left upon the ground till it were come to this condition, the fibres of the ſtalk, which are its valuable part, and make the threads of linnen, would be ſpoiled; therefore it is to be pulled before that time, in order that the threads may be tough.

The plain doctrine is, that they are tough while they have ſome juice in them; and rotten, or at leaſt brittle when they have ſtood upon the ground till all the juice is evaporated. That being a kind of careleſs curing by the air, in the place of that regular and delicate manner in which the farmer is to prepare them for ſervice.

Therefore it is plain that if they be left ſo long upon the ground they get great damage; on the contrary, if they be pulled up too ſoon, theſe fibres have not their due ſtrength and value. There is a time when they are perfected by nature, and that the huſbandman ſhould learn, and ſhould ſeize for his ſervice; for all things, when they have attained perfection, begin to decay.

While the ſtalk of flax is full of juice, the fibres are too ſoft for their intended ſervice; and when the plant is gathered at that time, they break in the working, and there is great waſte. Therefore the plants muſt ſtand longer than this period. There is a time when very little more juice is ſent up through the ſtalk, which is when the ſeeds in the heads have attained their bigneſs, and want only hardening: it is then the flax ſhould be pulled. It may be known by the condition we have juſt named in the ſeeds; as alſo by examining the fibres themſelves in the ſtalk, for they are weak and watery when the plant is too young for pulling; and they are dry and brittle when it has overſtood the time. While the ſtalk is full of juice, theſe fibres cannot attain any firmneſs becauſe of the moiſture: when the juice has utterly ceaſed riſing, they are dried up by the winds and ſun, and by that means loſe their toughneſs. There is a period between the two, and no other is proper for pulling the flax. The juice of the plant does not at once ceaſe to flow, but by ſlow degrees. As the ſeeds acquire perfection, leſs and leſs is ſent up from the root; and it is in this ſtate that the fibres in the ſtalk gradually harden. Before it is entirely ſtopped the plant ſhould be gathered, becauſe when it ceaſes altogether the ſun and air act too forcibly upon the ſtalk: while any ſap riſes, theſe fibres are not expoſed as dry threads to its influence; and before it ceaſes utterly, the plant muſt be pulled up: for theſe fibres are then in a condition to bear the management by which they are to be prepared for the manufacture, with the greateſt advantage.

When the crop is left too long upon the ground, the rind of the ſtalk cracks, and the fibres are expoſed to the ſun and wind, which drying them up too haſtily, deſtroy them. On the contrary, when they are gathered too ſoon no care in the ſucceeding management can render them tough as they ought to be. There is in each caſe alſo a loſs of the ſeed, for when the crop is pulled too early, no curing can make the ſeed perfect; and when it is left too long upon the ground, the pods burſt open, and between the field and the floor a great deal of the beſt ſeed is loſt. The Dutch find a rule for gathering their flax in the colour of the ſtalks; when they appear of a pale and ſtrawey hue, they know it is time to pull them. But in England this is no certain rule, for according to the ſoil and ſeaſons they grow pale and yellowiſh ſooner or later in reſpect of their real maturity. When the flax is pulled it muſt be gathered up into ſmall heaps with the heads all laid one way; and it is beſt to lay them to the ſouth, that the noon day ſun may have its full influence upon them. They muſt be turned occaſionally till they are regularly and equally hardened; and then carried off the ground. The time for this is uncertain: in very favourable weather a fortnight anſwers the purpoſe, in worſe it is the buſineſs of three weeks.

It has been a practice in ſome places to ſtack the flax as ſoon as it is in a condition, without ſo much as getting out the ſeed; and it has been pretended by the advocates for this method, that the ſtalk and the ſeed both received advantage from this. The threads of the ſtalk growing more tough, and the ſeed getting a greater degree of hardneſs on the ſurface by which it was preſerved from injuries; but it does not appear from trial that either of theſe benefits ariſe from the method, and there are certain diſadvantages attending it, for the ſeed will in part ſhed and be loſt, and the ſtalks will be hurt by vermin, which find at once food and ſhelter in the ſtacks. Ingenious methods have been deviſed of deſtroying theſe, but unleſs ſome good can be ſhewn to ariſe from the practice, it will be better to omit the occaſion of the miſchief than to ſeek a remedy.

CHAP. XLVIII.

Of the preparation of the land for flax ſeed.

AS clayey ſoils, and thoſe of the like nature are the beſt with proper management for raiſing this valuable crop, the farmer ſhould attend to all the general rules for their improvement, which we have given when treating on that ſubject in the preceding volumes; and after the addition of proper manures, the throwing up the land in ridges in winter will be of excellent ſervice.

The more clayey grounds are expoſed to the froſt, winds and air, the more fertile they become; and in this caſe the laying them out into broad lands afterwards at the time of ſowing, will give the whole ſuperficial part of the ground another breaking of the parts, which will be greatly uſeful.

If the tough ſoil to be dreſſed for flax lies upon the deſcent of a hill, the common method would do harm, for if the deep trenches we have directed were made ſtrait down the hill, the water in violent rains would waſh down all the rich part of the ground with it. To prevent this, the furrows ſhould be laid croſſwiſe of the hill, and the ſame kind of lands laid out as in the former direction. Then there ſhould be opened two deep trenches one on each ſide of the ground. Theſe are to run lengthwiſe, and the uſe of them is to diſcharge the ſuper-abundant moiſture from the trenches between the lands. Thus the wet in the hard rains of winter will not run ſtrait off as in the other method, but will be detained againſt the next ridges: what fine mould is waſhed out of the firſt, will be received into the ſecond and not loſt; and the firſt ridge from which it came will not be impoveriſhed, for it will have received as much from the higher grounds. All this time the trenches between the lands opening into the two which run lengthwiſe at the two ends, there can no wet lodge in them to the detriment of the ground. The huſbandman may contrive this ſo as to ſuit his advantage; for according to the depth at which the furrows between the lands open into the trenches at the ſides, the whole quantity of moiſture will be drained away, or only ſo much of it as is found ſuperfluous. This is a general method of managing ground which is kept in tillage on the ſides of hills; and we ſee it with pleaſure adopted by the Iriſh, who read with diſcretion. The directions at large ſuited to all kinds which lie in this manner,

ner, may be found in the preceding volumes: we treat here particularly of this clayey ſoil as to be dreſſed for flax.

When the ground is thus prepared for the crop, its condition ſhould be well examined in the reſpect of richneſs; for on that muſt depend the quantity of ſeed allowed to the ground. If land be very rich, and the ſeed ſown thick, the crop will probably be beat down, and lodged by rains before it is half ripe; and there is no crop whatſoever which would ſuffer more by ſuch an accident than this. The timely care of the huſbandman muſt prevent that miſchief, which if it happen no art can remedy. He is to ſow ſparingly. The crop in this caſe will be able to ſupport itſelf; and the quantity will yet be very great. For although there be fewer ſtalks upon the field, every one of theſe will be thicker and better nouriſhed, and will yield more and better thread.

There is alſo a plain advantage behind, namely, that the land being leſs exhauſted will be the more ready for another crop.

We have ſpoke before of the advantage of ſowing clover with flax. There is no inſtance in which this conduct is more proper than the preſent: for a larger quantity of ſeed may be allowed to rich land when clover is to be ſown with it, than where it is not: the clover keeping the ground moiſt, gives better hold to the ſmall fibres of the root; and the ſtalk of the flax being ſupported at the bottom, will be in the leſs danger all the way up.

If we obſerve the ſtalks of plants which are blown down by the winds or lodged by rain, we ſhall plainly enough perceive the reaſon of this. The weak part of the ſtalk is juſt between earth and air, juſt where it riſes out of the ground; and this gives way either bending or cracking with the weight of rains, or by the force of winds: this is ſupported by the clover growing about it, and ſurrounding it to ſix inches height; and it is able from this ſupport to bear the weight of rain, or ſtand againſt the force of wind much better than it otherwiſe could. When the flax ſtands thick, it may be lodged by means of the weakneſs of the ſtalk in any part; and this will naturally enough be occaſioned by the plants choaking one another, and ſtanding ſo cloſe, that every ſtalk is as it were drawn up and weakened. The free acceſs of the air dries it; and gives it the needful hardneſs.

This is a conſideration which extends farther than to the immediate danger of the crop's lodging; for the very ſubſtance of the ſtalk is never perfect unleſs it have this free admiſſion of the air; and though the crop ſtand up very well when it riſes thick, as it may do in ſtill and dry ſeaſons, yet the threads of the ſtalk will be weak and poor, that is, the great crop will produce bad flax for the manufacturer, and a third part of the quantity might be worth more money.

This is a caution of great importance, and the leſſon is a very plain one that the farmer has from it. It is that a flax crop ſhould never be ſown ſo thick as to ſhut out the air from freely blowing upon the ſtalks, and from an eaſy paſſage between plant and plant.

This gives a natural and certain preference in favour of flax crops, to the grounds we have been mentioning on the ſides of hills above thoſe which are flat.

It is not to be denied that the beſt flax in the world is produced upon flat grounds; for the province of Zealand, where the culture is moſt underſtood, is of this kind. But it is as certain that if the ſame perſons had the management of flax upon grounds which had ſome aſcent, they would produce yet finer crops of it.

The reaſon of their ſucceſs is not that the ſituation is advantageous, but only that they underſtand the culture of the plant. Their land has the advantage of firmneſs, and this is in their favour; but the level ſituation is againſt them in more reſpects than one; it not only ſubjects the crop to want of air, and a free thorough paſſage of wind, but the wet is naturally too much, and their trenches between the lands, though an excellent method, do not always remedy that inconvenience.

We have vaſt choice of ſoil and ſituation in this kingdom; and it is certain if the Zealand huſbandmen had our land, they would be more eminent than they are in raiſing this plant.

The moſt advantageous piece of ground of all others would be one which had the proper ſoil, and which roſe gently in the middle, falling off in an eaſy deſcent each way. Such may be found in many parts of the kingdom; and beſide the common benefit of the ſoil, it would yield a larger and better crop of flax than any other, becauſe the ſeed might be ſown thicker, and the plants would ſtill have the free air and ſun: theſe are as requiſite to give a conſiſtence to the fibres, as a ſound and good ſoil is to nouriſh the plants; and the ſeed would have the ſame advantage with the ſtalk, in theſe places: it would ripen better than in a leſs airy ſituation. By changing the ſeed from one of theſe grounds to another, we ſhould obtain much better at home than we at preſent import from abroad. The Flemings or Zealanders have no advantage over us in this reſpect, and yet they have better ſeed of their own produce than any they import from abroad.

There is alſo a particular and forcible reaſon why we ſhould, if poſſible, ripen good ſeed at home, for we can be ſure of its being freſh when we ſow it; which, though it may be gueſſed from the appearances we have named, can never be certainly known in regard to any that is brought from abroad.

Flax ſeed will grow when it has been kept ſome time, but it will not grow with the proper vigour. The ſtrength of the plants is an article of vaſt conſideration in flax crops; and we have ſeen by experiments, that there is great difference between plants raiſed on the ſame ground from ſeed of the laſt ſeaſon's growth, and that which has been kept longer. The new ſeed ſhoots two or three days ſooner than the old, and the firſt ſhoot is ſtronger and more vigorous. This original diſtinction is preſerved through the whole ſucceeding growth of the plant; and the preference is ſo great as to deſerve the moſt careful attention.

The ſoil on which flax is ſown muſt have ſome influence in directing the time of pulling it. We have obſerved that the exact period for doing this, is when the fibres of the ſtalk have juſt begun to harden, which is the time of growth when the ſeed has its full maturity in dimenſions, and begins to acquire that firmneſs in the rind which is to be its defence againſt accidents. The root at this period begins to ſend up leſs juices, and the fibres which had their due growth before, having now leſs moiſture naturally harden. This is the courſe, and this the time of the change when the flax grows in ſound and firm ſoils, which detain, even in the heats of ſummer, ſome moiſture, and which defend the roots by their firm covering from the heat of the ſun. The ſtalks at the period juſt named change colour; and there is that obvious notice for the huſbandman, that the time of pulling the flax approaches, beſide what he finds in the condition of the ſeed.

But in crops of flax, which grow upon light and looſe ſoils, this drying up of the juices is too haſty, and the change of colour comes on before the ſeeds have attained this degree of maturity. This is called by the flax huſbandmen the *firing* of the crop. In this caſe the flax muſt be pulled, though neither the ſeeds nor the fibres of the ſtalk have acquired their due maturity: for if it be ſuffered to remain longer on the land, the ſtalks dry up in the irregular manner we have before-mentioned; and the flax, when it comes to be dreſſed, is dry, brittle and harſh; a great deal is waſted in the working up, and the remainder comes but to a poor account, for it is never comparable to the true tough thread of ſuch plants as have had better advantages of growth.

This ſtrongly confirms the rule we firſt laid down, that flax never ſhould be ſown but upon firm ſoils, which approach to the nature of clay. In theſe the root is defended from the ſun, and ſupplied with moiſture as long as is required for the ſervice of the ſtalk, and conſequently the reducing the quantity of juice ſent up, and the drying of the fibres, which happens naturally from this cauſe, come on gradually: whereas, in the field of flax on a dry light ſoil the ſun has free admiſſion to the roots, and the ſupply of moiſture ceaſes: the drying of the fibres is performed too ſuddenly; and they are ſcorched up inſtead of gradually hardening. Hence the term uſed by the farmers of *firing*, is not ſo improper as it might ſound at firſt, and the pulling it immediately becomes unavoidable.

The ſeed of this flax not having attained maturity when this happens, can never be perfect, and therefore the plants raiſed from it muſt be poor.

Theſe are reaſons which abundantly ſhew that flax will never be raiſed to advantage in England, unleſs it be a firſt rule not to venture it on any occaſion upon looſe and dry ſoils.

No ground ſhould be thought of for raiſing of flax which has not a due quantity of clay in its compoſition. The ſoil in which flax is cultivated in Courland, Livonia and Muſcovy, is ſaid, by travellers, to be ſandy, but it is in reality a very rich loam. The huſbandry of that country is not equal to ours. The ſand appears upon the ſurface after rains which have waſhed down the heavier part of the earthy matter, and carried off too much of the lighter particles. In this condition it appears ſandy, and is therefore called by that name; but though ſand is ſeen on the ſurface, there is a firm mould at the bottom; and it is in this the flax roots; and to this it owes the nouriſhment which perfects the ſtalk and ripens the ſeed.

The effect of the looſe ſurface of the earth in thoſe lands is, however, diſadvantageous. It makes the ſtalk dry too haſtily when that operation is once begun; and conſequently the flax of that part of the world is uſually pulled ſomewhat earlier than any would wiſh. They have the art of managing it while it lies upon the ground better than all other people, and by that means they get the better of a great part of the natural diſadvantages; but the ſeed, though very fine, would be more perfect, if the plants had ſtood longer upon the ground: and indeed there is a great deal of difference in the ſeveral quantities of flax ſeed we receive from thence: ſome being full, plump and perfectly fine, and ſome on the other hand poor and thin. This is the difference between the ſeed of one crop of flax and another, though they have grown upon the ſame kind of ſoil: the ſeaſon will make them ſo far exceed or fall ſhort of one another; and in general there is this difference: but the fineſt of all the ſeed from that part of the world is ſuch as has had the deepeſt and tougheſt of their ſoils; when the plants have come to their maturity in that gradual manner which is ſo eſſential to the perfection of the ſtalk as well as the ſeed.

CHAP. XLIX.

Of the draining of marſh land.

THE quantities of land in this kingdom, which are ſubject to the overflowings of ſalt water, from their lying either near the ſea, or in the reach of the high water of large rivers, are very great; and the advantage of ſecuring them from this accident is obvious. Great tracts of ground might be raiſed to a higher value, which at preſent are more uſeleſs than if they were ſunk at the bottom of the ſea; for the vapour that riſes from the wet mud left upon them, infects the air, and deſtroys the inhabitants. The civiliſing of nations by degrees removes theſe natural annoyances; or in the beſt ſtate of the account, turns them into benefits. We boaſt of having all its effects here; but this is an inſtance that we are too vain of our improvements. Many of thoſe marſh lands which are deſtructive to all who breathe the air of them, unleſs they have been born in it, may be rendered healthful and pleaſant, by proper draining and ſecuring

curing of them againſt inundations; and the very cauſe of the miſchief would then become the means of their fertility.

The mud and weeds, with the refuſe of animal bodies, and other ſubſtances of the like kind, which the water brings upon theſe lands in overflowing them, is the cauſe of that ſtench, and the offenſive vapours which riſe from them, and this is a moſt excellent manure.

Egypt, at this time the moſt fertile country in that part of the world; and for ages paſt, the granary of all the neighbouring nations, is naturally a ſandy territory, waſte and barren: the ſource of all its fertility is the mud and refuſe of floods left upon it, by the regular overflowings of the Nile. We may by art turn to the ſame account the overflowings of our own ſea coaſt, and the like lands. The advantage poſſeſſed by Egypt is, that the flood comes at a certain time, and they are ſecure from inundation the reſt of the year. The rich mud therefore which the river left when it retired to its channel, may lie to dry at leiſure, and afterwards is to be cultivated without danger of a ſecond flood, while the crop is upon the ground.

This is all the difference in the preſent reſpect, between Egypt and the overflowed lands of other countries. It is a happineſs that nature provides them a ſecurity againſt a ſecond inundation, while the crop is growing; but what nature does for the Egyptians, we may procure for ourſelves. We may receive thoſe floods upon the land which come rich and full of this nouriſhing matter, and we may ſecure the ground againſt being overflowed afterwards; thus the refuſe of the flood will be left in all its ſtrength upon the ground, and may be uſed in the ſame manner as the mud of the Nile in its proper country. The land being kept dry, will no longer yield that offenſive and unwholſome ſtench, and the crops will thrive abundantly; for this matter, thus left by the water, is at once ſoil and manure.

Theſe are the advantages, and no pains ſhould be ſpared to obtain them. The expence is often conſiderable, but it is a benefit that laſts; and the owner of ſuch land ſhould never compute it, without laying down, at the ſame time, the additional value of the ſpot. In general, it is recovered from a ſtate wherein it is worth nothing, and the undertaking ſhould be conſidered as a kind of purchaſe.

A ſloping bank will be at all times a ſecurity; and the materials being on the ſpot, the whole expence is labour. If the bank were raiſed perpendicular againſt the ſea, it would be ſoon waſhed to pieces; but the ſtrongeſt power of the waves is loſt, when they are received upon a ſlope and eaſy aſcent.

According to the height to which tides riſe, the bank muſt be carried up higher, or leſs high. In general, about ſeven foot above the level of the land is ſufficient; and this will require a bank of twelve foot diameter at the bottom, which may ſlope off to about a yard thickneſs at top.

If the ground be covered with a turff, let that be ſaved for facing the bank to the ſea; and if otherwiſe, aſſoon as it is made, let it be ſown thick with graſs ſeed, that there may be a natural covering of the ſame kind. The graſs ſeed for this purpoſe ſhould be that of a ſalt marſh, not of common meadow hay, for there are peculiar graſſes which thrive where the ſea comes; and theſe only are fit for the facing the abſolute bank of the water.

Open a trench of the ſame breadth, which will be neceſſary for the foundation of the bank, and begin the work at three or four foot from the edge of the trench. This trench, which is to ſupply the materials for the bank, will, in common caſes, require to be about four foot deep; and the ſtuff is all to be worked up into the bank as it is dug. For the intent is, that it ſhall bind firmly; and all earths will work cloſer, and hold better together if wrought up juſt when they are taken out of the ground, than after they have been at any time expoſed to the air.

The bank ſhould go off in ſuch a gradual ſlope to the ſea, that from the top to the bottom ſhould be eighteen or twenty foot in ſuch a bank as we have named; but to the land, it need not have more than two thirds of that ſlope. If the ſea is ſubject to be very rough, and to beat violently upon the ſhore in this place, the turff, be they ever ſo good, ſhould be employed only to face that ſide of the bank which faces the land; for if they be uſed on the ſea ſide, the tides will waſh them off before they can mat themſelves together by their freſh roots; and they will only fill up the bottom with refuſe. The ſowing of graſs ſeed is the only method to this purpoſe: the ſlope of the bank muſt be raked fine and ſmooth, and the ſeed ſown very thick upon it in the evening of a mild day, and raked and trodden in. A few days will bring it up; and as ſoon as the new graſs is five inches high, it muſt be mowed, that it may not run up to ſtalk. This will give ſtrength to the roots, and they will in a little time ſpread and entangle themſelves in ſuch a manner, that the face of the bank will be ſecure againſt all damage, covered by a kind of tough carpeting of roots; and ſo level in its aſcending ſurface, that the waves, though ever ſo furious, can only run gently up; doing no damage, becauſe nothing oppoſes them.

The trenches, if properly managed, will ſerve as drains for the land; and there may be an aperture from them, with a flap door which opens outwards, as we have directed for the draining of marſh land in our former volumes; which will let out the land water, without any poſſibility of letting in the ſea.

Whoever ſets about this work, muſt begin with a reſolution not to trifle; and the quicker it is done, the better. As many hands ſhould be employed upon it as can work upon the ground without ſtanding in one another's way: the price is the ſame in the end, whether a ſmaller number of labourers do the work in a longer, or a great many in a ſhorter time: and the advantage of employing numbers, is, that the whole is done together without thoſe interruptions, which occaſion cracks and inequalities in the work: and the earth bends the cloſer, for being wrought as ſoon as it is taken up. High tides and ſtorms are often very troubleſome interruptions in this kind of buſineſs; but theſe alſo are leſs to be feared, when the work goes on briſkly.

If at any time while the bank is freſh made, the water breaks in upon a part of it in a ſtorm, and begins to waſh away the mould, the utmoſt care muſt be taken to prevent the ſpreading of the miſchief; for when one piece of the ſubſtance is torn away, more will quickly follow. The firſt ſecurity is to ſtretch a piece of ſail cloth over the part that is broke in upon, and faſten it carefully down. The waves will riſe over the ſmooth ſurface of the cloth, as they do in other places up the ſurface of the bank, and this will ſecure the broken place for the preſent. Then as ſoon as the tide is down, or the ſtorm is over, many labourers muſt be ſet to work at once, and the breach in the ſurface perfectly repaired. The ſlope of the bank muſt be again laid entirely ſmooth and even; and preſſed and wrought firmer than in other parts.

When there is an opening from the ſea, which at once lets in the water from thence at high tides, and lets out the freſheſt from the neighbouring lands into the ſea at low water,

ter, we have given the common method of lodging a trunk in the bank, with a door that opens outwards; but in caſes where a ſluice may be neceſſary, there requires this farther direction, that it be made very ſtrong, becauſe of the weight of water it is to reſiſt and ſupport: and that it be built while the whole gap which lets in the ſea is open. The broader the paſſage, the leſs is the violence of the force in any particular part. It will require to be all banked up afterwards; but the work of the ſluice will be much better conducted, while the whole is open, for in reducing the gap to a ſmaller compaſs, new force is given to the water. Therefore let the foundation of the ſluice be laid in the loweſt part of the channel, and let it be made ſtrong and ſound. When this is finiſhed, let the bank be made each way from it to the high ground: and in this, as in all other ſuch works, let hands enough be employed; for nothing is ſo uſeful in theſe undertakings as expedition.

CHAP. L.

Of the ſecuring of land, liable to be overflowed by rivers.

TO the general rules we have before laid down on this head, it may be proper to add here certain cautions, which have ariſen from later experience, for the facilitating that work, and ſecuring its ſucceſs. The ſecurity muſt be given by banks, and theſe will require to be of the ſame form with thoſe made to keep out the ſea; only that they need not be ſo ſtrong, as the force cannot be nearly ſo great.

The ſea often beats full upon the bank, which is made to keep it off the land; but the river runs lengthway of it. Its courſe takes off a part of the dead weight, and the common motion forward prevents the lateral preſſure: this makes a great deal of difference in the neceſſary ſtrength of the bank for one occaſion and the other; and there is alſo a vaſt diſproportion in the abſolute weight of water to be reſiſted.

This may ſhew the huſbandman, that the banks which keep out a river, have no need to be nearly ſuch as thoſe which keep off the ſea. But let him not carry this account ſo ſtrictly, as to reduce the bank, which is the ſole defence, to too ſmall a compaſs.

The height muſt give the general rule for the thickneſs; and this muſt be proportioned to the riſe of the water, which is to be feared. The computation in this inſtance is more difficult, than in the other; for the riſe of tides is pretty exactly known. And theſe occaſion the floodings of land from the ſea; but the riſe of rivers is from rains, and theſe are leſs certain.

Always guard againſt the higheſt that can be expected. It is very ſeldom theſe are known to riſe more than three foot perpendicular above the level of the land, that is to be ſecured from them; and taking this as a middle computation, we may give the height of the bank, and its other dimenſions, theſe naturally riſing from that.

The firſt rule is, that the bank be a foot higher than the higheſt expected riſe of the water; therefore we will eſtabliſh the preſent at four foot; and for the conſtruction of a four foot bank, the breadth at the baſe ſhould be ſix foot, and the longeſt ſlope, that is, the ſide to the water ſhould be ten foot. Then a ſlope of ſix inward or toward the trench, will be ſufficient. The trench itſelf will require to be five foot deep, and the baſe of the bank ſhould be on that ſide, at the diſtance of eighteen inches from the trench. The work is to be regularly carried up as we directed in the other caſe, and the top of the bank to be a foot and half broad.

This will be meaſure ſufficient for ſtrength and ſoundneſs, and the whole will be finiſhed at a very moderate expence, conſidering the advantage.

The great care to be taken is to know the utmoſt height to which the river is to be expected to riſe, and the bank muſt be carried up ſo much higher than that, as to leave no fear of over-running.

The diſtance from the river is a very material article alſo: for the rapidity with which water pours down from the high grounds, after violent and continued rains, is ſuch, that it ſometimes will over-run all banks, unleſs there be left a ſufficient compaſs. In the fen countries they make banks of eight or ten foot high, and they raiſe them at ſuch diſtance from the river NEN in particular, in ſome parts, that they allow a quarter of a mile or more for the reception of the water, which yet will ſometimes riſe over thoſe high banks at that diſtance, and overflow many thouſand acres of the flat land.

This example may ſhew the neceſſity of taking ſcope, and raiſing the banks high enough in the banking of rivers. Nothing can lay down rules for this height and diſtance in particular inſtances but experience, and this is to be ſought from the teſtimony of the ſobereſt and moſt intelligent perſons, where there is not ocular proof.

The great ſecurity of banks is the free courſe of the water between them, and the ground is not loſt which is between the bank and the river. The time of floods is the only part of the year when it is overflowed, and theſe leave their manure behind them; for there always is a ſettlement of fine and rich mud. The ground being enriched by this, will produce a great quantity of graſs. Theſe lands anſwer very well for grazing, as the Lincolnſhire farmers find; and as ditches ſerve to ſeparate them from one another, inſtead of hedges, theſe being always wet, the water-trees may be planted to advantage upon their banks; oziers, willows, poplars, and the like, thrive there perfectly well; and though theſe are of much leſs value than the generality of trees, yet they anſwer in places where they grow without care, or trouble: for a branch of any of theſe ſtruck into the ground, with the top cut off, becomes a tree.

The expence of banking is leſs than thoſe could conceive, who are not accuſtomed to it: for though it is all done by labour of the hand, which is uſually chargeable, the ſoil cuts as eaſy as garden mould, and the riddance that is made would ſurpriſe any that are not accuſtomed to ſuch undertakings.

In taking the account of the higheſt riſe of floods, whether it be from obſervation, or the accounts of other perſons, the farmer ſhould always ſuppoſe them ſomething higher than the mark; for the making a bank ſomewhat higher than it need be, is no inconvenience, beſide the ſmall additional expence; but the erring of the other ſide is giving up all the expected advantage.

The undertaker is not to ſuppoſe that he can add to the height of the bank afterwards, if it be found needful, by carrying the top higher. All the parts of a bank muſt be proportioned; and the height conſidered in the baſe; or it will be of no value: the weight of water which will bear againſt the banks at the time of flood is ſo great, that they will be deſtroyed by any irregularity in their form. There is nothing can ſecure them againſt this, but the gradual ſlope of their ſides; and this ſlope will be loſt, when any height is to be added after the work is finiſhed. The breadth we have allowed for the top of the banks, in the proportions we have named, is abſolutely neceſſary; and if the undertaker ſhould think he could add height, when he afterwards found it wanting, by raiſing theſe up to a ridge, he would deceive himſelf entirely; there would be no ſecurity in a part, whoſe ſharp edge would be always wearing away; and on the other hand, if he attempted to carry it up ſtrait, the alteration of the ſhape, in that part, would give the water power, when it roſe ſo high, and the new work would be preſently waſhed away. Therefore there is no method of heightening a bank, when it is once made. If it ſhould be attempted, by giving it a new coat all over, that would not be ſecure, for it would never mix with the reſt, and the waters would waſh it off. The firſt deſign gives the whole hope of ſecurity; and that muſt always be proportioned to the occaſion; upon ſuch principles as thoſe we have laid down, the meaſures are eaſily varied, and banks of any height, or for any purpoſe, may be erected on the like plan.

The ſeaſon moſt proper for banking is the latter part of ſpring, and the beginning of ſummer. This is a time when labourers are eaſily ſpared from other employments; and when there is no danger of floods in the proſecution of the work. The hay ſeed ſown upon the ſlopes readily ſtrikes root at this time of the year; and the earth which is to be wrought digs freely, and binds well together, becauſe of the remainder of the winter's moiſture that is yet in it.

If the ground be very tough and ſtrong, the bank may be begun nearer to the edge of the trench than we have named: for the reaſon of allowing a foot and half diſtance, is, that the edge of the trench may not break in by the weight of the bank; and the ſtronger the ground, the leſs danger there is of this. On the other hand, when the ſoil is very moiſt and crumbly, it is beſt to allow a larger ſpace, for the ſame reaſon: becauſe if the weight of the bank breaks in the edge of the trench, there is danger of the bank itſelf giving way, or at leaſt of a weakneſs in the adjoining part, which the next ſtorm will burſt, or the next flood will bear againſt that part, and probably break it in. The depth of the ſlope is a ſecurity in ſome degree againſt this danger; for the more perpendicular the edge of the bank ſtood, the greater would be the preſſure; and on the contrary, the more gradual the ſlope, the leſs the force: and added to this the diſtance of the very bottom of the ſlope from the verge of the trench, compleats its ſecurity.

The undertaker underſtanding thus the nature of the work, and the purpoſe of this diſtance, will know how to leſſen or encreaſe it, according to the nature of the ground: and tho' the firſt care muſt be to keep it ſecurely, yet when that is regulated, the nearer the bank riſes to the edge of the trench, the cheaper is the work; for at the beſt there will be a conſiderable diſtance from thence, to the farther part of the baſe, and this will give ſo much the more trouble in working it up. Theſe are the conſiderations which direct the banker in this article; and every little point ought to be obſerved in large works, becauſe it becomes of importance from the quantity.

CHAP. LI.

Of preventing the water on high grounds, from overflowing thoſe below.

WHEN the ſame perſon is owner of the high as well as low grounds, this is eaſy: and the damage, when it is omitted, is ſo great, that none ſhould neglect it even on the leaſt occaſions. There are grounds ſo ſituated, that the ſudden fall of rains upon the higher lands behind them, have as abſolute an effect in overflowing of them, as the ſea or rivers have on others: the method is to give the water a free and fair courſe, without allowing it any place of irruption into theſe grounds. The cutting a few drains in a proper direction, will anſwer this purpoſe, and their own earth banks them. When they are by theſe and the preceeding directions ſecured from all fall of water from other parts upon them, the next care muſt be to prevent their becoming too moiſt, from the rains which fall on their own ſurface.

There are low grounds of ſo looſe and ſpungy a ſoil, that the very water which comes upon them in rains, without any drain from elſewhere, will ſwell the ſurface, and keep the land in a condition approaching to the nature of a bog. The graſs will be poor and ſour; and the feet of cattle will break through the turff. This is generally occaſioned by a firm bottom, which detains the water, and by ſome natural head in the lower ground: in this caſe drains muſt be cut, if the piece lie naturally ſecure from inundations; but if it be banked out from the river, there muſt be a ſluice in the bank for the diſcharge of the wet. A very ſmall one will anſwer this purpoſe; and the land will be kept juſt in what condition the owner pleaſes.

There is no ſituation in which the farmer has the advantage of flooding his lands at pleaſure, like that of banking. In this caſe, as it is his bank alone that keeps out the floods, he can, by making an opening, let in the water; and if he watch the proper time for this, and conduct it properly, nothing is ſo great an advantage. He manures the land without expence, and that in a better and more equal manner than could be done any way elſe.

He muſt obſerve to let in the flood at a proper time, and when the water is in a right condition: and he muſt ſuffer it to remain on no longer, than while it is able to do ſervice. For long lying upon the place, will ſoak the earth too much, and make the graſs ſour.

The time for letting in the water is the beginning of winter. And it ſhould be done at the firſt of the flood, that is, as ſoon as the water is well impregnated with the rich particles of the lands from which it has run.

In the beginning of floods the water is thick, and full of the light and rich mould of theſe upper grounds, and of the beſt parts of their manure. But this, if not let in upon the grounds, runs off to the ſea; and is loſt, and the remaining water of the flood is poor in compariſon: it comes thick indeed, but it is often yellow with clay, or the other foul bottom of the ground.

Therefore at the firſt of the flood, let the farmer open it a paſſage upon his low grounds; and when he has got enough of it to cover the lands, let him cloſe it in. He muſt let in no more, for that would keep the whole in a continual diſturbance; and his buſineſs is to let it abſolutely reſt. In this caſe a ſettlement ſoon falls from it; and as ſoon as that is done, the water is to be let off again by opening the ſluice, or by drains. Thus it will only have lain long enough to moiſten and mellow the ground, and will have taken ſome of the fineſt part of the mud in with it. The reſt will lie like the mud of the Nile, in a thin even coat upon the ground, and the next rains will waſh it in thoroughly. Thus that which in a ſtate of nature would have rendered the ground uſeleſs, becomes, under the management of art, a ſource of fertility. If once flooding does not anſwer the farmer's purpoſe, it is eaſy to repeat it, and the doing this at ſeveral times, is better perhaps than covering the ſurface too deep at once.

By this method of banking out the waters, and letting them in again at the pleaſure of the farmer, the grounds which before were uſeleſs, become excellent paſturage and hay lands; and a few years of the produce, pays the whole expence. The ground thus recovered, may be planted in proper places with trees; and thus every advantage obtained from it, that can be expected from ſuch land as nature has placed in the beſt condition.

CHAP. LII.

Of roads.

NEXT to the raiſing the farmers crops, the moſt eſſential conſideration is that of his carrying them to market, and this brings into our view the roads by which they are to be conveyed. There is ſcarce any thing more neglected in England, than the care of thoſe roads which are not under the publick inſpection and controul. Turnpikes have made the great roads excellent, but in bye ways, where only farmers, or few others come, the lanes are uſually torn to pieces, and gulled in holes in ſuch manner, that it is ſcarce poſſible to paſs them. In clays the wheels generally riſe at one foot and cut deep into a hole in another, and the very mending of them, where it is attempted, is ſo little underſtood, that the remedy is often worſe than the diſeaſe.

The proper work is eaſy, and if it be a little more expenſive at firſt, it pays many times over by the continuance.

Of all ingredients for roads large gravel is the beſt; and this is plentiful enough in England. It may in many caſes be dug upon the ſpot; in moſt, very near; and it ſhould be laid on immediately from the pit, becauſe then it binds much faſter than it will afterwards. The clay and loam which are among gravel, are tough and clammy while the gravel is freſh, but when it has been thrown up at the ſide of the pit, the ſun and air calcine theſe earthy ingredients, and they become crumbly: and in this caſe the wet waſhes them ſoon away, and leaves only the pebbles, which wanting their natural cement, will be a long time before they are brought into a condition of ſervice.

The beſt gravel for roads is that which has a great quantity of flints, and a moderate portion of this clay or loam in it: for ſuch alone will bind firm. Pebbles are rounded, and there will require a great deal of a tough matter to bring them into a compact maſs; but the flints are irregular in ſhape, and they lie agreeably enough among the pebbles, ſo that leſs of the earthy matter binds them: and when ſuch a gravel is well laid, and broad wheels are firſt brought over it to bring it into form, it will in a little time cement into a body like rock.

When ſuch a gravel is choſen, the making the bed of the road is the next conſideration. This is always to be done with the matter that is upon the ſpot, unleſs there be deep holes or other great inequalities to be made up.

The bed of a road ſhould never be flat, for the covering muſt be of the ſame form with the bed; and if the road be flat when it is finiſhed, the water will lodge upon it, and every hollow made by the carriages will be ſoon ſunk into an abſolute hole.

On the other hand, the raiſing a road too high is no leſs a fault; this endangers the turning over of carriages and many accidents; and it anſwers no good purpoſe which a very ſmall rounding would not ſerve as well. If there be height enough in the middle to throw off the water, and the ſides be ſo rounded away that none can lodge there, it is all that can be required. A natural hard bottom rounded well off, and covered with ſuch a gravel as is here directed, will make a road that will be always ſecure, good, and laſting.

In making a road in this manner, the firſt care muſt be to examine the natural bottom; if that be clay, though in itſelf it make a very bad road, yet being covered, it will be a very fine one. In this caſe no more is required than to clear off the dirt from the ſurface; and then when the pure clay is ſeen, the holes muſt be filled up with ſome of it, and the ſurface of the whole intended road laid in a regular rounded form. This ſhould be raked over, and upon this ſhould be laid the gravel. It muſt be ſpread every where to an equal thickneſs, and then the firſt carriages which are brought on muſt be broad wheel'd. Theſe muſt be drawn in different tracts till the road is as it were rolled by them, and thus in a little time the whole will be wrought and fixed, and will unite into one body like the walk of a garden. When it is once arrived at that ſtate, no water will lodge upon it, nor any carriage hurt it.

This is an effectual and excellent method of mending bad roads for the ſervice of the farmer, or rather for making good roads in the place of bad ones. For this is abſolute new work though the expence be ſmall. But this advantage is only to be obtained where the bottom is good; as where the ſoil is clay, or ſomething ſound and hard, of the ſame nature. In other caſes there will be a neceſſity of making an artificial bed for the gravel; and this muſt be done by means of ſome other ingredients.

When the natural bottom is tender, ſtones ſhould be thrown on, if it be in a country in which they lie near the ſurface; and if otherwiſe, brickbats and the rubbiſh of old buildings will anſwer the purpoſe. Theſe will form a looſe bed, and will perfectly well receive the gravel. It will fall into the holes between them, and make up with them one very good and firm body.

Where the caſe is ſtill worſe, and the ground is rotten with great hollows, theſe ſhould be filled up with faggots: and none anſwer ſo well as blackthorn, or a mixture of that and alder. The more wet there is, the larger quantity of alder ſhould be admitted, for where this wood lies always wet, it laſts a vaſt while. In either of theſe caſes the faggots are to be conſidered as a kind of underſtructure; like the piling of buildings. and a bed of clay or other tough earth ſhould be laid upon them in the proper form; then ſome ſtones or brickbats, and upon theſe the gravel. In this manner the road will laſt a great while, and there is no expence the farmer need ſo little grudge. The dirt that he takes off from the ſurface in any of theſe caſes, will ſerve as manure for one part or other of his land; and the reſt of the work will give him ſo much comfort in the conducting the reſt of his affairs, that it is the beſt money he can beſtow, after the immediate care of his land.

As the farmer will naturally dig the gravel for this occaſion on his own ground, and as near as he can, let him obſerve the quality of it. In the bed very often there is a foul and coarſe kind in one part of the ſtratum, and a pure and fine one in another. In this caſe let him keep them ſeparate, and lay on the foul coarſe kind firſt, reſerving the other to make a coat or cruſt for it.

The gravel ſhould be raked as it is laid on, and the hardeſt part, that is, the largeſt ſtones drawn up toward the middle. If any hollows appear after the firſt quantity is laid on, let theſe be very carefully filled up before the ſecond quantity is drawn over; and the whole being finiſhed as expeditiouſly as the nature of the work will allow, for the quicker it is done the better it will bind together. As to the height of raiſing the middle, about ſeven inches is the beſt riſe in a road of twelve foot over, and in the ſame proportion it may be made to anſwer any breadth.

The quantity of gravel neceſſary upon theſe roads is not like that on the great high roads repaired by turnpikes: the continual heavy carriages on thoſe make a great depth neceſſary; but in theſe farmers roads upon a very good bottom, ſeven inches depth of gravel will be ſufficient; and in the worſt, from ten to twelve will be the moſt that need be uſed.

The breadth of one of theſe roads ſhould never be leſs than eighteen feet; and always the broader the better. This ſmall compaſs here mentioned is only to ſave expence, and is the leaſt that can, with any convenience, anſwer the purpoſe.

It is common to plant trees along the ſides of roads, but the farmer ſhould have ſome advice on that head. The advantage of timber is very well known, but things may be rendered detrimental by their conſequence that are ever ſo good in themſelves. The great article in keeping a road good is the preſerving it dry. Care is taken of this in the raiſing it in the middle for carrying off water; and every other caution ſhould be uſed on the ſame occaſion; a road that is wet can never be firm, and one that is ſhaded by trees will very ſeldom be thoroughly dry.

When roads are very broad, plantations of trees ſucceed extreamly well at their ſides, becauſe there is ſpace between, and a free courſe for the ſun and air: but it is not ſo in narrow roads; theſe will be over-ſhaded by their heads and branches, and conſequently the ground will never be hard. In large roads the plantations of trees are as ſo many avenues, beautiful as well as uſeful; and they thrive becauſe their roots run under the ſurface of the road, which is a great ſpace that no growth exhauſts. On the other hand, the rows of trees in a narrow road, form a kind of long arbour or ſhady walk, where the ground is rotted by the continual damp; and the next grounds are the more exhauſted by their roots as the ſpace of the road is narrower, and affords them leſs nouriſhment.

Therefore, if the farmer chuſes to plant trees by theſe roads, let them be pollards for ſhrowding, not upright ones for timber. And let him take care the ſhrowds of theſe do not ſpread too far; and cut them rather oftener than he would in any other place. By theſe means the ground will be kept dry, and yet there will be ſome advantage of a plantation. Pollard trees do not anſwer in any proportion to thoſe which grow for timber; but there is a convenience in the quick growth and frequent cutting: and it is a ſort of wood the farmer always wants. In the planting the ſides of theſe roads, let him obſerve the ſoil, and ſuit the trees to it, according to the kinds directed for the ſeveral ſoils in our preceding volumes. Theſe little conſiderations have great advantages; but they are too much neglected. He who in every article of his profeſſion takes in a view of the whole, will be moſt likely to ſucceed to the full extent of his purpoſes.

In many caſes it may be in the power of the huſbandman to make a new road in other ground, inſtead of mending, or as we propoſe new making the old; and in that caſe he ſhould conſider which will be moſt worth his while. No certain rule can be laid down for this; but according to the circumſtances, he will find moſt advantage in one or the other.

The firſt conſideration is, whether he wants the dirt of the old road any where near the place for manure: for this dirt muſt be all taken off, whether he has any uſe for it or not; and conſequently, the expence is conſiderable, if it be not wanted within ſome moderate diſtance.

That the dirt of ſuch a road will be a valuable manure, is very plain from its own nature, and from what we have ſaid in explaining the kinds of manures. This dirt is the mould of the ſurface ground to pieces, with the dung and urine of cattle mixed among it, and the rotted parts of the leaves, and boughs of the trees. Add to this, that it has lain a great while unexhauſted by any growth, and the whole conſideration is greatly in its favour as a manure. If the trees have ſhaded it, it is ſo much the better; for the farmer very well knows, that ground which is ſhaded always grows mellow. His crops of pulſe improve the land principally by that means; and it is a certainty that ſhaded ground, though it does not bear any thing while it is ſhaded, becomes very rich by that means, and is ready for producing crops as ſoon as properly expoſed.

From all theſe conſiderations, the huſbandman may be aſſured, that the dirt of one of theſe roads, which muſt be cleared away in order to the mending them, will be an excellent manure: but its value is of no conſideration if he does not want it, nor have convenience of ſelling or uſing it: in this caſe it will be cheaper, if the other circumſtances are in his power, to make a road in new ground, than to repair in the manner we have mentioned this other.

In the repairing the old, beſide clearing away the dirt, there muſt be ſome expence in filling up of holes; and as the whole ſurface of the bed of the road muſt be laid regularly, there will be much more labour in bringing this old worn and rough piece to that true ſhape, than in clearing off a new ſpot of ground.

In new ground, if the under bed of the ſoil be of a right kind, the road may be wrought with very little expence or trouble. The regular method of doing it is this: if the upper coat of the ground be abſolutely firm loam, mark out the breadth of the road, and at each edge of this ſpace open a ditch, leave the ſurface of the ground between in its natural ſtate, and raiſe it to form with what is dug out of the ditches.

The upper coat which comes up the firſt ſpades depth, muſt be kept for other uſes. If it be piled up in a large heap, the turff will rot, and it will be a good manure; and will be worth carriage to many parts of the land that want refreſhment. The next bed of earth is to be uſed for the road; and ſo on, to as much depth as is neceſſary for the raiſing the middle of the road to a due height. When the ground is marked out, and the upper ſpade's depth of ſoil is taken out of the trenches, let the whole be looked over, to ſee if there be holes in any part. In that caſe they muſt be filled up with ſtones, brickbats, or other hard ingredients, ſo that the whole ſurface of the ground between the trenches be made level, before any thing is laid on. If this be omitted, the hollows in the ground will be ſo many holes in the road, in ſpite of all care or prevention.

When this is done, let the earth from the two trenches be thrown to the middle of the ground, intended for the road; and let it be ſpread and raked off to the edges: till by this means a bed is prepared, ſuch as we have directed in the other caſe, to be made out of the natural ſurface. This ſhould be ſufficient to give the whole that degree of roundneſs which is needful for throwing off water; and when it is thus prepared, let the whole lie five or ſix weeks to dry and harden.

At the end of this time, let the gravel be brought on, and laid in an even covering from the centre down each ſide. Then let broad-wheeled carriages, and no others, come on to preſs it; and let them be drawn along every part, that the whole may be preſſed equally. It will thus make a firm, ſound, and laſting road.

This is a very good method, where there is this middling kind of ground, hard enough to ſupport the gravel; but not ſufficient to ſtand the preſſure of carriages alone.

Where the under ſtratum is gravel, the work is much eaſier; and no roads whatſoever are ſo good, as may be made in this cheap manner. Mark out the form of the road by a gardener's line and ſtakes, and then dig away the upper ſoil one ſpade deep; or if it be requiſite, a little more. It ſeldom lies much deeper than this over gravel.

When this is cleared off, and laid in heaps to rot for manure, level the bottom, and thus make an even coat of gravel. Bring in more gravel to fill up the place of that which was dug out, and to raiſe the ground a little higher in the middle, to throw off wet. This is leſs needful in theſe than in any other roads; and may be omitted; but it is always beſt to do it: a very little more gravel anſwers the purpoſe: for it is in all ſoils a good rule to throw off the wet, though gravel receive leſs damage from it than others. In this caſe, the road is in a manner made upon the ſolid foundation of the natural ground; and the earth at the two ſides forming a ſteep bank to the new quantity, ſerves as an abutment on each ſide, againſt which all the preſſure of carriages can have no force; and conſequently the road it ſupports, muſt continue ſtrong and good.

As ſoon as theſe roads are paſſable for carriages, the ſurface muſt be marked with a careful eye, to ſee whether it ſinks in any place. Wherever this happens, the hollow muſt be filled up with large hard gravel at once, and the ſurface levelled with the reſt; for it is eaſier to remedy theſe faults when they are new, than when the weight of carriages ſinking hard into them, has not only made the hole itſelf deeper, but diſturbed the neighbouring part of the bed; which is always the caſe, when holes are left to bulge.

Any riſing of the ground is alſo to be obſerved, while the road is new, and ſhould be levelled; for the conſequence of letting it remain ſo, will be certainly an hole juſt beyond it. The wheels are raiſed up by this ſwelling, and they run off from it: they either break the level juſt beyond the riſing, or at a ſmall diſtance forward, where they meet a ſtop.

As water lodging upon a road always damages it, there ſhould never be any one made without a ditch on each ſide of it to receive the water, which, in our way of conſtructing it, will run off its ſides: and care muſt be taken for a free paſſage for this water, at leaſt when it riſes beyond a certain level; for if it be permitted to ſoak the ground under the bed of the road, the whole work will ſoon come to decay. The great care is to keep all dry above and below, for wherever the earth is wet it is ſoft; and wherever there is a ſoft part in a road, the weight of carriages will find it, and it will preſently be preſſed into a hole, which, as the cauſe lies below, it will be impoſſible to cure by any addition above: and if it be unſeen, diſregarded, or miſunderſtood, it will ſpread till the whole work will be in a manner ſpoiled.

We have ſeen that to preſerve a road good, it muſt be kept dry; and one eſſential quality is, that the bottom ſhould be hard: but by a neglect in this matter, of letting the water out of the ditches, both theſe good purpoſes are deſtroyed. The ground above can never be dry, becauſe the bottom is wet; and that which is wet, cannot be hard. One would think propoſitions ſo ſelf-evident as theſe, muſt occur to every body, and could admit no overſight; but the huſbandman is accuſtomed to do his buſineſs in a certain road, and out of that he is at a loſs for any thing.

Very few years ſince I ſaw two inſtances of this damage in Northamptonſhire, of very different kinds, but plainly tending to the ſame end, the deſtruction of the road; and from the ſame cauſe, the ſoaking of the under part with water. The one was in a farmer's road made in a turffy ſoil, by cutting two trenches, and piling up the earth between them. Theſe trenches were twelve foot diſtant, and the road of that breadth. It had ſucceeded very well for ſome years; for though the trotting of a horſe would ſhake it for a vaſt way, yet the wheels of carriages were very well ſupported on it. But after this time, the ditches filled up at the ends, and the water ſoaked the bank or road. The conſequence was, that it became impaſſable; for the wheels cut in, and made holes that could not be mended, and even the horſes fell in often up to the belly. This was removed by clearing the mouths of the ditches, and repairing the holes with thorn faggots, and tough earth over them; and the road became, and now continues as good as it was at firſt.

The other inſtance was in a road made alſo with two trenches, and covered with a rough irregular ſtone, which is common near the ſurface in that county. It ſucceeded as well as the other till the ditches kept full of water; and then the ſtones, which had before lain upon the bed of the road ſunk: this while it continued dry, was a ſound and good earth; but being now ſoaked with the water, it ſoon grew rotten, and the ſtones, which had at firſt lain flat or nearly ſo, ſunk in at their ends and ſtood edgewiſe; and ſoon after the heavieſt of them went through; the whole, inſtead of a firm hard road covered with ſtone, became a parcel of abſolute mud full of ſtones lying in it in all irregular directions, and the place was altogether unpaſſable. This was its condition till the cauſe was ſeen, and the water let out; but even then it was neceſſary to take up the whole road, and lay the ſtones even, before any thing farther could be done. The expence was very near as much as that of the firſt making the road; and it might all have been prevented by keeping the paſſage of the water clear to a certain level.

Theſe trenches or ditches at the ſides of roads, beſide the conſtant care of keeping the courſe of the water out of them clear, will require ſometimes to be cleaned of the mud at their bottoms throughout; and this may be done without any real expence, the mud ſerving according to its kind as manure for ſome of the lands; and very well paying the expence of taking out and carriage.

We ſay according to its kind, for it will partake of the nature of thoſe ingredients of which the road is made, and according as that is gravel, ſtone, or other ſubſtances, this mud will be ſuited to various kinds of lands: this we have explained at large under the article manures.

Summer is the only ſeaſon for making of roads, and the earlier in that time this work is begun the better it will ſucceed. We know the effect of froſts is to moulder and break the toughneſs of earth, and this in roads we want to preſerve: therefore the ſummer is the only time. Wet is the great enemy of new roads, for the firſt article we want is their drying and hardening. This alſo throws us upon the firſt months of ſummer, becauſe there may be reaſonably expected a great deal of the proper weather to follow. It is alſo a ſeaſon, as we have obſerved before, when hands may be very conveniently ſpared for the buſineſs. Roads which are naturally good are eaſily preſerved in that condition,

dition, by only filling up the holes at times as they are made, and rounding off the ſides ſo as not to let water lodge. This is very eaſy when an eye is kept upon them from time to time, but there is nothing that gets ſo much miſchief by neglect as a road; and there are very few things wherein that miſchief is not more eaſily repaired.

Roads are naturally worſt in the wetteſt countries, and therefore it is there the greateſt care muſt be taken of them. The ſame principle holds good which we have eſtabliſhed for draining of lands, and the work is the eaſier as abſolute dryneſs in the ditches is not required.

It is very particular what the author of the ſcheme of raiſing hops in bogs advances in relation to the height at which water may ſtand without damaging the ground; and this is in ſome degree verified by what we have obſerved of roads. The water in the trenches will not ſoak the ground though it riſe to a conſiderable height, ſo it have at that height a free paſſage.

CHAP. LIII.

Of the mud of the mouths of great rivers conſidered as a manure.

A Farmer in Suſſex was obſerved to ſucceed better in his crops than his neighbours, and after many years wonder they began to enquire into the cauſe. He had never made any ſecret of it, and the neighbourhood now enjoy the advantage in common. The whole ſea coaſt of the kingdom, near the mouths of great rivers may afford us a manure: the mud and ſettlement of theſe waters after floods: and the thought was ſo natural and ſo correſpondent to what we know of the effects of things in farming in general, that it is wonderful any who had the opportunity neglected it. The farmer knows that the common mud of rivers is, on many occaſions, an excellent manure. He knows alſo that in floods it is much richer, becauſe the rains have waſhed into it the fineſt mould, and part of the manure from thoſe cultivated grounds upon which they have fallen, and over which they have run. He lets theſe waters in upon his paſture land where he can, while they are yet thick with the mud, that the rich manure may ſettle from them and fertilize his land; whether or not they are thus uſed the mud will ſettle, and wherever it does ſo, there is this rich manure; and it is well worth the taking up.

Often there are irregular openings into the land near the mouths of great rivers, into which, when the water is received, it has time to ſettle, and the mud is ſeparated from it, and is in the ſame ſtate with that which is left upon a piece of ground, where the water of ſuch a flood has been purpoſely let in, and has ſtood to ſubſide. There are alſo banks about the edges of rivers in many places, which in the ſame manner detain the water and receive the mud; and even upon the coaſt of the ſea itſelf, there are often ſhallows among rocks or behind points of land which receive the water as it has run out from the mouth of the river, and give it time to ſettle. From any of theſe the mud may be taken with great eaſe, in the ſame manner as it is dragged from the bottoms of ſhallow rivers, with an inſtrument made hollow for that purpoſe, and fixed to a long pole.

The expence is little, and the benefit is ſurpriſing. The mud thus collected has many times the virtue of that from the bottoms of rivers or ponds: for it has the advantage of all that fine and rich mould which the flood waſhes from the high grounds; and with this of the ſalt of the ſea. Few know how great and excellent a manure this is: we ſee the addition of a little ſea ſalt is an excellent improvement in manures; and the benefit of ſteeping ſeeds in brine is known to every farmer. But ſea ſalt in the one caſe, and brine in the other, though they approach to the nature of ſea water, fall very far ſhort of its virtues. They are made from ſalt, one ingredient of the ſea water only; and there are many.

In the preſent caſe the farmer has the advantage of them all, he has a rich mud mixed with a ſmall quantity of ſea ſand, and impregnated with all the other virtues of ſea water, as alſo full of the parts of ſea plants and ſea animals, all excellent in manures. Experience ſhews, that one load of this is equal in effect to three of river mud; and reaſon eaſily explains why it is ſo. There are the advantages of many manures in one, and they are ſuch as unite happily, and join their influence agreeably in promoting the effect of each other.

It is only in places ſituated conveniently for this particular manure that it can be had, and it would be vain and idle to attempt the mixture elſewhere; for ſalt will neither in this, nor any other inſtance, really anſwer the purpoſe of ſea water. Where it is any where near, it is worth while to get it, for it is one of thoſe manures that will very well pay the price of carriage.

Nothing equals it for thoſe graſs grounds which lie high and bear a ſweet graſs, but not thick; for it encreaſes the quantity without hurting the delicacy of the growth.

For this purpoſe it ſhould be laid wet upon the ground, and ſpread after it has lain long enough to crumble and obey the hand of the workman: then if it be rolled over, the rains which follow, waſh it entire into the ground, and in three weeks there ſhall not be the leaſt appearance that any thing has been laid upon the ſurface; but the ſpring ſhoot will ſoon after ſhew it. The effect upon graſs grounds will very well laſt three years.

It is of equal uſe on land that is in tillage, but experience ſhews that in this it is not ſo laſting. A quantity of this ſpread upon a poor hungry piece of corn land gives it, for the time, all the qualities and properties of the moſt rich ſoil; but the benefit is, in a great meaſure, confined to the preſent crop, for the rains waſh away the ſalts, and the ſun exhales the animal part in a very little time, where the ſoil is thus open and the ſurface expoſed: but the covering of the turff preſerves the particles of the manure longer in the ſoil, and the roots of the graſs being perennial, the ſtrength and vigour they receive from this dreſſing continue with them to the ſucceeding years.

In a ſaintſoine ground which has ſtood a long time, and is grown weak, this is alſo an excellent refreſhment. If the crop have been planted by the drill for horſehoeing, let a quantity of this manure be ſpread over the intervals and plowed in: if the plants riſe promiſcuous from the common method of ſowing, the beſt opportunity is, when they are eaten cloſe, to ſpread a quantity of it after it has lain to dry a little, and can be conveniently diſtributed equally over the land. This is not equal in effect to the other uſe of it, becauſe with the richneſs of the addition, there is in that caſe alſo the benefit of a plowing between; but in either caſe is excellent, and it does for each crop as much as it is poſſible for a manure to do.

Theſe are the beſt methods of uſing the ſea mud alone, but when the farmer has not immediate occaſion for it for theſe purpoſes, he will find it very well worth his while to collect it in what quantity he can, and mix it in among his dungbills. It will thus rot and blend with the reſt, and will give a very great additional richneſs to the whole. In the uſe of it on corn lands we have been obliged to acknowledge that its virtue is not laſting; but this method of mixing it with the dunghills and making it rot and mellow with the reſt of the matter which compoſes them, gives it the ſame faculty of laſting in the ground that they have, and the whole dunghills are greatly improved by it.

After this they are to be uſed in the ſame manner, and on the ſame occaſions with common dunghills, and it will be found, that they will go farther than in the common courſe of buſineſs. Eight load of this dung, if there have been a tolerable mixture of the ſea mud, will go as far as ten of any other, and this is no ſmall advantage.

CHAP. LIV.

Of the uſe of lime water as a manure.

IT is with pleaſure we ſee the farmers begin to uſe their reaſon more than their fathers did, who were carried in all things by blind cuſtom; and conſequently prevented the improvement of their art. At preſent the advantages of new methods are ſo plain, that they are no longer terrified at them under the name of projects: they not only adopt what is propoſed, but invent new practices themſelves. What we have here to relate of the uſe of lime water is one of theſe improvements, and is owing to the ſagacity and ſpirit of a farmer who is a benefit to his country, and an honour to his profeſſion.

This perſon had a piece of paſture ground near his houſe which was of a good ſoil, but had the inconvenience of being ſubject, in an uncommon degree, to worm caſts. He had heard of lime as a deſtroyer of worms, but this was not all which induced him to the experiment. He had read that lime will give virtue to four quantities of water one after another. Upon this principle he proceeded. He ordered a large quantity of lime to be put into a tub, and water in abundance to be poured upon it. The next morning this water was drawn off, and labourers poured it down by pailfulls in different parts of the ground. This was when the graſs was taking its firſt growth for hay; and the worms were moſt troubleſome of all.

More water was poured upon the lime, and uſed in the ſame manner a ſecond, third, and fourth time, and the effect not only was very great in deſtroying the worms, but the graſs grew thick and full in a very ſurprizing manner.

The farmer the next year, inſtead of doing this in ſpring, poured on the lime water as ſoon as the firſt crop of hay was carried off the ground, and after pouring the three waters on at two days diſtance each, he had the laſt quantity uſed lime and all.

The lime was by this time reduced to a powder as fine as that for the hair; and ſtirring it up with a ſtump broom, the water was taken out thick with the powder. This was poured on as the reſt; and no manure was ever ſo equally diſtributed over a field: the conſequence was a quick and ſtrong growth of the leaf, and he had a very good ſecond mowing.

The labour was conſiderable, but the advantage very well anſwered it. In all theſe caſes one muſt be computed with the other, and the charge is never to be regarded when the produce makes amends.

Our farmers have long been kept at a low ebb of profit, by the fear of venturing their money in bold improvements: but if theſe be conducted with knowledge, there is nothing ſo advantageous. I have known many ſtarve upon their common courſe of buſineſs, but I never knew one inſtance of money being properly laid out upon land, but it returned the advantage many fold.

The owners of land are intereſted in this particular more than thoſe who rent it; but both ſufficiently. The late improvement of eſtates in the north of England is ſurprizing; and the benefit has been deferred to the preſent age, partly becauſe agriculture was but ill underſtood, and partly becauſe there wanted ſpirit to advance the neceſſary ſums.

This is a general doctrine, but it is not a little applicable in the preſent inſtance, wherein nothing but the price of labour can prevent the extending the practice; by which alone it can be known, whether what was a particular benefit in the inſtance juſt named, can be made a general one. Experience in more caſes will ſhew this plainly.

CHAP. LV.

Of brewing malt liquors in the moſt advantageous method.

WE have in the preceding volumes given directions for the choice of malt, hops, and water for the ſeveral methods of brewing; and need not here repeat any thing on that head: but as the Dublin ſociety have publiſhed ſome uſeful obſervations on this ſubject, and ſomething has been done in the way of improvement by our correſpondents, who have tried the methods unpropoſed: what has been advanced from theſe two ſources we ſhall now lay before the reader. It is by theſe means uſeful knowledge may be beſt encreaſed; and in this and the other articles of the preſent volume, which depends principally on the experience of our correſpondents and others, ſince the publication of the firſt, it will be our care to admit no article but what is conformable to reaſon; and comes well ſupported by experience.

It is a certain truth that nothing tends ſo much to improve malt liquors as proper boiling; neither the virtues of the malt nor of the hops riſe in vapour. Therefore there can be no loſs of ſtrength, or any other uſeful quality in the wort by boiling: and the advantage is moſt evident.

This fact that nothing is loſt by it, has been lately proved by the moſt certain experiments. If a quantity be boiled in an alembick or common ſtill, inſtead of a copper, the diſtilled liquor is nothing but water. Therefore, in the boiling in coppers, nothing but the watery part is evaporated, and the liquor gains ſtrength without loſing any good quality.

For this reaſon all methods ſhould be uſed which conduce to the full boiling of the beer, and we are to acquaint the reader, that the largneſs and depth of the copper is one. It is proved by experience and careful obſervation, that the ſmaller the quantity is which is kept boiling, the more it evaporates in proportion. Now there is but a certain quantity that can be permitted to be evaporated, and as this will be done ſooner in proportion in the ſmall than in the large copper, it follows plainly that the beer cannot have the ſame advantage of boiling in ſmall quantities that it can in larger.

The world has been long perplexed about the nature of that particular and excellent malt liquor called London porter; and many reaſons have been aſſigned why it cannot be made in private families. This article of boiling, which has not before been taken notice of, is one.

The peculiar and excellent quality of porter depends, in a great meaſure, upon the full and thorough boiling; and therefore, in conſequence, it depends, in a great meaſure, upon the vaſt quantity which brewers make at a time.

The perfect incorporation that is made of the meal of the malt, and in ſome meaſure, even of the coat, in porter, can be no otherwiſe attained than by a very ſtrong boiling. Now upon the principles already laid down, the brewers have this advantage over all private families, that they can give the liquor a boiling the others cannot, becauſe the ſame proportion of the liquor will be evaporated in a ſmall copper in four hours, that would be in ſix or ſeven in the brewers vaſt ones.

It is for this reaſon, that beſide all other conſiderations, porter can never be made to perfection by any but thoſe who make great quantities at once. We have before obſerved, that to come to its true quality it requires alſo long keeping.

Theſe are articles which the brewers chuſe to keep ſecret; and they therefore are fond of talking of the particular qualities of Thames water. It is to their intereſt to lead thoſe, who would rival them, upon a wrong ſcent: but beſide the advance we make by this means toward a diſcovery in the brewing of this excellent liquor, the fact is general; and being underſtood, will tend to the improvement of all kinds of beer.

It may be poſſible, perhaps, to invent the means of obtaining this advantage in private families, now we know the importance of it. The reaſon malt liquor cannot be boiled ſo long in ſmall coppers as is requiſite to its perfection, is, that it waſtes too faſt by evaporation. This may be prevented in part by covering the copper, and by this means we may have it in our choice to give any quantity a full and due boiling.

A tin cover, made in the ſhape of a very large funnel, would anſwer this purpoſe extreamly well, and by giving the opening what breadth we pleaſe, the evaporation would be reſtrained, moderated, and managed, in all reſpects, juſt as we choſe. If this cover were abſolutely cloſe, the liquor might boil ever ſo long without evaporation; and conſequently,

quently, according as it is more or leſs open, the evaporation will be quicker or ſlower. It may alſo be eaſy to moderate the heat of the liquor by keeping a refrigeratory round the funnel-ſhaped cover of the copper, filled with cold water, in the manner of thoſe which are made about the heads of portable ſtills; what effect the moderating the heat, by returning the evaporated part in drops perfectly cold would have, is worth trying; and by theſe, and the like means, we may render that a certain and regular proceſs, which has been hitherto an arbitrary proceeding, which they, who practiſed it beſt, did not at all underſtand; and which was kept therefore out of the reach of all improvement. It has been ſo in moſt articles of huſbandry, and it is ſo ſtill in regard to the greateſt number of things in family œconomy. We hope the ſpirit of improvement, which has been ſo ſucceſsful in one, will be extended to the others.

It is ſaid, that if hops be diſtilled alone, the water will have a flavour from them. It is not their bitterneſs, for that is a quality which chymiſts know never riſes in the ſtill; nor their roughneſs, which is alſo as incapable of impregnating a vapour, whether it be from this or any other ingredient.

Whether it be fact that the hop will yield a flavour diſtinct from theſe when it is diſtilled alone, we cannot ſay, not having made the experiment; but it is certain that when in the malt liquor it will not.

We mention this doubt, becauſe the ingenious author, who has written on this ſubject in the Dublin memoirs, thinks it can: and it may be proper to obſerve, that in this article of trying the qualities which will riſe in diſtillation, a great deal of accuracy is required. It has been aſſerted by a great French chymiſt, againſt the general doctrine that bitters do not riſe in vapour, that the diſtilled water of colocynth is bitter. But I have heard an Engliſhman of as much knowledge, and perhaps more care in operations, aſſert that this was an error. He had alſo diſtilled colocynth, and the water was taſteleſs.

This gentleman ſuſpected, that the French author might have been deceived by the noſe of the inſtrument being touched by colocynth, and a ſmall particle or two ſticking to it which would give a bitterneſs to the water: and perhaps in the preſent inſtance, though a very fair trial in all appearance, may have been made, yet the oil of ſome former diſtillation may have remained unobſerved in ſmall quantities in the head of the ſtill, and have given the flavour ſuppoſed to ariſe from the hops. The gentleman who mentions the experiment ſays it was made with a ſtill. If it be repeated with a new retort or glaſs cucurbit and prove ſo, there will be no room for doubt.

The practical brewer will pardon this particularity in the enquiry: it is by theſe accurate trials we arrive at the real knowledge of things; and we are labouring for his ſervice.

Thoſe who have conſidered theſe ſeveral qualities in the hop, have ſuppoſed it would be better to obtain the fine flavour, and the delicate bitterneſs from it without the auſterity or roughneſs; and it is ſaid that leſs boiling of the hops will give theſe, and that therefore longer boiling of this ingredient ſhould be avoided: but it is certain that hops have more boiling in porter than in other malt liquors, and the effect is a great improvement in the drink; and there is no arguing againſt known experience.

It is affirmed alſo that long boiling evaporates the fine flavour of the hop; and leaves only a coarſe bitter and a rough taſte: but this is ſaid of hops boiled alone in water. It is otherwiſe in regard to thoſe boiled in malt liquors, which are of a tough nature, and entangle and detain thoſe particles, which perhaps would be loſt if the hop were boiled in water alone. If the caſe were abſolute, and that long boiling was uſeful to the malt, and prejudicial to the hops; theſe might be put in afterwards; or the method we have propoſed of having a cover to the copper would prevent the evaporation of that oil, which is ſuppoſed to contain their high flavour: and by theſe or the like means, the malt might have that degree of boiling which it requires, and the hop no more than was judged proper to obtain its virtues.

Theſe are points which deſerve particular attention: for the art of brewing is very imperfectly underſtood, and there is no way beſide to get at the true method of improvement. Experiments will beſt determine whether or not the hop ſhould have a great deal of boiling; but we are ſufficiently aſſured that the malt ſhould; and if it prove that the ſame boiling which is uſeful to the one is hurtful to the other, it will be very eaſy to give the due proportion of time to each as we have directed.

In the beginning of this chapter we have obſerved from repeated and conſtant practice of the greateſt brewers, that to give the full ſtrength of the malt, there requires a great deal of boiling: and we have given a method of reducing the degree of heat in caſe that ſhould be neceſſary, by condenſing the vapour in the cover of the copper, and returning it cold into the liquor.

By this means, and by a due regulation of the fire, the liquor may, at the pleaſure of the brewer, be kept at the utmoſt heat under boiling. The two methods of long boiling, and long ſtewing in this manner, ſhould be fairly tried to ſee which produces the beſt beer. We are abſolutely uncertain in this point; and there is the more reaſon to bring it to a fair trial, becauſe what is now ſaid to be the general practice of brewers, declares in favour of the long boiling; and the ingenious author of the Dublin obſervations is of the opinion, that the other is the true method. What that gentleman advances is very probable from chymiſtry; but we have better foundation when we depend on facts. The trial is eaſy; we have recommended it to ſome of our moſt curious correſpondents, and wiſh it may be alſo fairly made by others.

This gentleman, who is ſo much an enemy to boiling, ſays, that it diſſipates the ſpirit of the malt: but this is a point eaſily brought to the proof, and we apprehend will go againſt him: for it does appear that no ſpirit can be made from malt by ſimple boiling; fermentation is required for that purpoſe, and all the boiling of beer is given before fermentation.

Therefore no ſtrength of the liquor is loſt by boiling; and a great deal is obtained. It is true, that if beer be boiled to an extract, that will be tough and gluey; but the boiling given in any way of brewing does not amount to any thing of that kind: it only extracts the full ſtrength of the malt.

Whichever way this queſtion, as to the boiling the liquor a longer or ſhorter time, ſhall be determined; it is certainly a right meaſure to infuſe it firſt, for the mealy part of the malt is thus ſoftened by degrees, and impregnates the liquor much the more ſtrongly in the boiling afterwards.

The author, whoſe opinions and obſervations publiſhed in the Dublin papers occaſioned this chapter, is of opinion, that long maſhings are as hurtful to beer as long boiling. We have been the more particular in this matter, becauſe the experience of our correſpondents in ſome things con-

tradicts,

tradicts, as it in others confirms his opinions: and have ſtated the whole before the candid and judicious reader, that it may be diſcovered, by different trials, whether long maſhing and long boiling have, or have not the good effect attributed to them; whether the hops gains or loſes in the flavour it gives the beer by a length of boiling alſo: and at what time it is beſt put into the liquor.

CHAP. LVI.

A cheap and eaſy way of calcining clay to ſerve as a manure.

THE value of clay, when calcined or burnt to a certain degree for uſing as a manure, has been explained in the preceding volumes; and as nothing need be added to convince the farmer, it is a kind highly deſerving his conſideration, all we can have need to add here is, that we have repeated proofs that what is there ſaid of it is true. It muſt be therefore very deſirable to him to know in what manner he may burn it at leaſt expence, and this is a ſubject happily treated in the memoirs of the Edinburgh ſociety.

Clay itſelf is in a manner univerſal, and all that can be deſired to extend its uſe, is this eaſy proceſs of preparing it.

Mark out a piece of ground forty two foot in length, and twenty two in breadth, in ſome waſte place near the ground where the manure is to be uſed, and near where the clay can be dug with eaſe.

Upon the piece of ground which is marked out, draw by a line nine channels four foot aſunder, and ſixteen feet in length. The ſurface between theſe muſt be levelled, and they muſt be dug ſix inches deep and the ſame in breadth, they will thus be four foot aſunder, and the whole ſurface level between them.

Make four channels acroſs theſe nine at four foot diſtance, and clear them to the ſame depth and breadth with the others; lay the turff and mould, that is cut up in making the trenches, in the middle of the ſquares that are marked by the trenches, and then cover the trenches themſelves with thick tiles, or bricks.

They muſt be left open where they cut one another, for theſe parts are to ſerve as ſo many chimnies, but every where elſe they are to be covered up as cloſe as poſſible.

Draw a part of the ſtuff cloſe to the bricks or tiles to keep them in their places; and then raiſe a kind of wall between every two trenches of the dry turffs. It muſt be a yard high; but it requires no more thickneſs than will be ſufficient to keep it together.

After this is done, build the walls at the ends with wet clay; and leave a hole at each of the channels for lighting the fire. This wall need be no higher than the others, but it ſhould be a foot thick.

Over each of the holes where the channels meet, raiſe a chimney of looſe bricks two yards high; and ſecure it on the outſide with ſome wet clay.

Then lay ſtraw over the channels, and over that ſome faggots: lay in ſo many as will fill up the ſpaces between the walls to a level with the walls themſelves, and then build up alſo walls of clay at the two ſides in the ſame manner with thoſe at the ends; and leave a hole of nine inches over each channel, as in the former work.

Cover the whole with ſome good faggots, and fill up the ſpaces between them with fern or any ſmall ſtuff, to make the whole a tolerably compact and even ſurface. Then carry up the four walls at the ends and ſides as high as theſe faggots have raiſed the whole work, and it will be in a condition to receive the clay.

Let this be dug in as large ſpadefuls as can be, and lay theſe evenly upon the top of the faggots. The covering of clay muſt be two foot thick, and it muſt be laid tight and cloſe that the fire may be thoroughly well kept in: for if it gets paſſage any where it will waſte itſelf very ſoon; and without perfecting the intended operation upon the clay.

Beat up ſome clay and mould together with water, and when it is ſoft enough to be conveniently managed with a trowel, plaiſter the outſide of the walls with it very thick from the ground, up to a yard in height. By this means the clay of which theſe walls are made, will have its ſhare of the heat, and will become as good manure as the reſt. When all is thus prepared, bring a good quantity of clay, and lay all round the building: twenty load or more may be brought for this uſe: it is to be thrown on wherever the fire breaks through, and will by this means be calcined as well as the reſt, at the ſame time that it anſwers the purpoſe of keeping the whole in order. Make an opening of a yard long from the end of every one of the trenches. Let it be as broad and as deep as the trenches; but it need not be covered.

When all is thus ready, let the fire be lighted at break of day, that there may be the whole day for management; and let it be done in this manner. Obſerve which way the wind blows, and then prepare to light it: let all the other openings of the walls be ſtopped up, and in thoſe which face the wind, ſet fire to the ſtraw that lies over the channels. This will begin the fire, which will preſently ſpread over the whole place; the faggots and every other part kindling: and the clay ſtopping up the places where it would naturally burſt out into flames, it will continue burning in the intended ſlow and ſmothering manner.

Wherever there appears a crack in the top, let a quantity of the freſh clay brought for that purpoſe be thrown on, till it is entirely ſtopped; and thus this part will be calcined as well as any other.

As ſoon as the fire is well lighted, all the holes in the walls over the channels muſt be ſtopped up; and a perſon muſt be employed to go round continually, to ſee whether there be any crack where the ſmoak iſſues out: this muſt be ſtopt in time; and thus the heat will do its office; and the clay which covers the work will calcine through its whole ſubſtance, in a gradual and regular manner.

As the fire continues to burn, the materials will waſte, and the bed of clay which covers the top will ſink in an irregular manner, and in various places. This will occaſion more and larger cracks, and theſe muſt be covered with freſh clay, in the ſame manner as the former: but there muſt be a leſs thickneſs of it laid on, in proportion as the fire is grown weaker.

In ten or twelve hours the whole will be ſunk ſo, as not to be above a yard high from the ground; and then that part of the clay which lies upon the croſs walls, muſt be thrown in, eſpecially that which is leaſt calcined; and it ſhould be thrown where the fire burſts out ſtrongeſt.

If any part of this conſtruction burns dull, let a hole be opened in it; and the channel ſtopped up, which is oppoſite to it: and it will ſoon burn. When the clay brought to lay upon the cracks is all uſed, more muſt be brought for that purpoſe; and the whole, with the ſide and end walls, will thus be reduced together to a moſt excellent and valuable manure.

All the time this burning is continued, let freſh clay be brought ready to throw on when wanted, and let the walls and channels be kept in good order; the walls upright, and the channels free and clear from dirt: and let the chimnies, as the work advances, be always kept ſix inches at leaſt above the level of the ſurface. By this means, and by conſtant attendance, the walls and the whole maſs being kept in order, there will be no difficulty. If the fire be at any time expoſed to the air, it will preſently go out; therefore conſtant attendance muſt be given it day and night. The leaſt cracks will ſhew themſelves: for in the night there will be a white or greeniſh flame from them; and in the day they will be black at the edges. Theſe muſt be ſtopped as they appear, as we have directed; and if this attendance be given, there will be no doubt of ſucceſs; but careleſſneſs may undo any purpoſe.

If the clay be burnt in a rainy ſeaſon, the work ſhould be done upon a riſing ground; or if at other times rains come on, there ſhould be a hollow ſunk, with a ſpade round it, that the wet may run off.

When the whole is raiſed to twelve foot in height, the work will not well admit any farther quantity, as a man cannot throw up the clay from his ſpade higher; let it remain till the fire burns out through the top and ſides, and then pour on forty or fifty pails of water. Thus is the work accompliſhed; and in this manner, including every article of the expence, two hundred loads of clay may be burnt for about four pounds; it has been ſaid leſs, by thoſe who publiſhed the method, and perhaps the computation may be as exact there, as the preſent is for our part of the kingdom. If it were done at much greater expence, it would very well anſwer to the farmer; for there are few manures which take greater effect, or more laſting than this, when it is uſed with judgment, and upon a proper kind of ground.

CHAP. LVII.

Tht beſt way of uſing burnt clay.

THIS manure is excellent for paſture and corn lands, and anſwers upon both the eſſential purpoſes of deſtroying weeds and inſects, and promoting the growth of the crop: on paſture ground it has alſo a peculiar quality of altering, in ſome degree, the produce; for it never fails to bring up that excellent kind of graſs, the white trefoil or clover, which makes a fine bottom, without injuring the growth of the reſt. There will not be one blade the leſs of the graſs for this, though the clover perhaps, if weighed, would amount to a third of the quantity; and is a more nouriſhing food for cattle, and perfectly harmleſs.

The farmer is not to think theſe plants are formed ſpontaneouſly out of the mould, as muſhrooms were once ſuppoſed to grow out of the wood; and rats from the mud of rivers; but the fact is this. Winds blow about the ſeeds of this plant, which is common upon waſte grounds, and they are ſcattered in various places. Where there is a proper ſoil they will grow; otherwiſe they lie in the ground, or under cover of the graſs upon its ſurface a long time.

The burnt clay gives them the proper and favourite ſoil; and they never fail to ſpring up. As ſoon as the plants have got footing, they increaſe abundantly; running at the root, as well as ripening numerous ſeeds: and thus the bottom is covered, as if the plant had been ſown.

For this purpoſe the clay ſhould be burnt in November, and the aſhes ſpread upon the ground the following month, to the quantity of thirty, forty, or even fifty load to an acre. The worſe the condition of the land, the more of theſe aſhes are required; but this may be allowed, as they come cheap; and there need be little carriage, becauſe they may be burnt very near the place. The weeds will thus be deſtroyed, and this excellent plant will take their place.

The clay muſt never be uſed, unleſs when it has had the proper degree of burning; and for this reaſon, when the work is taken to pieces, if there be any parts of the top or ſides which are not ſo well done as the reſt, they muſt not be mixed in, but piled up in heaps by themſelves, and burnt over again, with a ſmall quantity of furze, or other light ſtuff, as is done in burnbaiting, and ſuch practices. In all theſe caſes, let the farmer do his buſineſs thoroughly, and he will never be diſappointed; but if he works by halves, he muſt not expect the whole advantage.

In regard to plowed land, the beſt and moſt advantageous method is, to lay this manure on a ſummer fallow, and ſow turneps; then corn. The turneps, in this caſe, always ſtand a better chance than in any other, and the ground is got into a fine condition for the corn.

The farmer ſhould, in all things, ſuit his work to his occaſions; and it is in no article more neceſſary than in this: for the great value of clay burnt to manure, is, that it ſhould be uſed immediately from the fire; therefore, when this is the caſe, let the work be raiſed near the field where it is to be uſed, and the operation performed in May. In June let the aſhes be ſpread over the fallowed ground, in the quantity of fifty loads to an acre, and then the turneps ſowed. They will come in at a favourable time; and if the ground be naturally too wet for the cattle feeding on them upon the ſpot; or if unfavourable ſeaſons make it ſo, they may be pulled up, and given under cover. When the ground is naturally wet, the farmer ſhould prepare againſt this accident by ridging and water-furrowing: and in that method, unleſs a dropping ſeaſon increaſe the miſchief, they will probably feed very well upon it.

The burnt clay, in this management, is excellent for cold, wet, and tough grounds; but this is not the only way in which it may be uſed with advantage. It may be burnt in autumn, or in ſpring, for the ſame kind of ſervice, and ſpread upon the ground immediately; after that it may be plowed lightly in, for the ſowing of the winter or ſummer corn, either of which it helps alike.

All aſhes are uſeful in the manuring of land; but thoſe of clay moſt of all. The aſhes of the turf in burnbaiting; and thoſe of ant-hills, when cut up and burnt for that purpoſe, all give great fertility, but none of them like theſe: none ſo ſudden, nor any ſo laſting.

CHAP. LVIII.

Of the caution to be uſed in the management of land.

WE are come to a period when the practice of agriculture is, in ſome branches, ſo well underſtood, that there may poſſibly be danger from the farmers too great knowledge in them, unleſs the land-owner has alſo ſome conſideration.

The old way of preventing exhauſting of land by croſs cropping, by inſerting proper terms in leaſes, has been found extreamly neceſſary; and perhaps more of this caution may be required, as the improvements continue. No encouragement can be too great for thoſe who mend land by draining, banking, incloſure, or laſting manures; or for ſuch as introduce new ſpecies, or diſcover better and ſafer management of the old; but there is a wide difference between thoſe who improve the land, and ſuch as only find the methods of raiſing temporary crops, which leave the ſoil much worſe than they found it. Theſe ſecrets have been known in the earlieſt times; but men have been too wiſe to practiſe them on their own lands, and too honeſt to uſe them on others. Nothing is an improvement that is not laſting; and the benefit ſhould be judged not by one year, but the ſucceeding condition of the ground. This is an article very worthy the attention of thoſe ſocieties, which diſtribute premiums for the encouragement of arts; for excellent as they are in their inſtitution, they may otherwiſe pervert the very ends they were eſtabliſhed to ſupport; and under the ſhew of improving, injure their country.

IT becomes us to uſe all honeſt freedom on this occaſion. The Dublin ſociety are a very honourable ſet of men; and they propoſed their reward for the raiſing the largeſt crop of wheat with the moſt upright intention; but they ſhould have added, that *it ſhould be done by means which would not damage the land.* And for want of this, they have given occaſion perhaps to great miſchief.

Mr. Yelverton obtained their premium upon the moſt reputable terms; for he produced a vaſt crop; and they had made no reſtriction as to the means: he was therefore at liberty to uſe any that he pleaſed; and he united all that are to be found in books of huſbandry; not only thoſe which promote the crop, but thoſe which are known to hurt the land.

Early in the preceding volumes we gave the method of burnbaiting, and obſerved, that great good management was required to prevent the damage which ſucceeded the immediate benefit of this practice.

Burning the ſurface is a certain method to produce one crop vaſtly ſuperior to what the land would yield otherwiſe, but this renders it ſtill vaſtly worſe afterwards. It was always a known practice; but it was for this reaſon limited to the moſt barren lands. Mr. Yelverton applied it to a piece of ground, which was far from being of that kind, and which had lain unplowed thirty years. He obtained a great crop by means not proper to be uſed; and it would be a general misfortune, if this part of his practice ſhould be followed.

The field, which had by this long reſt come to the ſtate of almoſt virgin earth, was in its nature looſe and mellow; theſe are the expreſs terms of the deſcription, and there is no doubt but ſuch a piece of ground would, by the common management, have yielded large crops, without the deſtructive article of burning; which was ſure to impoveriſh it for ſucceeding years, and could anſwer no other purpoſe,

poſe, than the obtaining one great crop as a prize; and for the glory and additional advantage of reward. There is no doubt, but Mr. Yelverton obtained a greater advantage from the ground that year, than he could have done by any other means: but this was all that was obtained; and this was not what the ſociety intended. They meant to promote the good of the country, not to hear a trick of one year's continuance; and it is ſo certain that this tends to do miſchief, inſtead of the good they intended, that if all the farmers in England were immediately to follow the ſame practice, the conſequence would be a great and dangerous reducing of the value of lands, and probably a famine. The gentlemen of property are intereſted in the firſt of theſe articles, the publick in the latter. It is their buſineſs to produce an equable and uniform improvement; not a temporary advantage, with laſting inconveniences.

We have named by what manures, and by what timely uſe of them, land which has been burnt may be continued in heart; but where theſe manures are not to be had, or where the ignorance, idleneſs, or diſhoneſty of the farmer, prevents his uſing them in the proper manner, it is certain that the effect of one crop, like Mr. Yelverton's, will be many years of laſting and terrible barrenneſs on the ſame land.

This is of importance; and let us examine it thoroughly. Mr. Yelverton's land was not ſuch as any man would have dreſſed in that manner for any other purpoſe, but that of obtaining one year's great advantage; and he owed the crop and the reward to his bad practice.

The other articles which promoted his crop, were what all farmers uſe; change of ſeed, and due ſteeping it in brine. The effects of both theſe we know are good, but of neither wonderful. Therefore the crop, which was indeed wonderful, being, I believe the greateſt ever procured from an equal quantity of land, muſt be attributed to the burnbaiting.

Mr. Yelverton obtained the prize of the Dublin ſociety, for burnbaiting a piece of rich, looſe, mellow ground, which had not been broke up of thirty years; that is, for one great crop he damaged a fine piece of land for ten or twelve years: for this is the abſolute fact. The richer a piece of ground is, the more it is hurt by burning, becauſe it burns away more than a worſe; and any man who intended a real improvement, would have moſt carefully avoided that practice. This is the plain and exact ſtate of the caſe, that gentleman obtain'd honours and rewards, for a practice which impoveriſhed the land; and which, if followed by others, would be a great diſadvantage to the kingdom.

The mould upon this land lay thin, and was but in ſmall quantity; and the burning the ſurface muſt have abſolutely deſtroyed a conſiderable part of it; this damage is evident; and it is one of thoſe not eaſily repaired. The ſmall remainder, in ſuch caſe, muſt be exhauſted almoſt beyond reparation, by ſupporting one luxuriant crop, ſuch as would be ſure to riſe from ſo fine a piece of ground burnt.

In ſhallow and rich ſoils, the contrary practice, in all reſpects, ſhould be obſerved: immoderate crops, any particular year, ſhould be feared; and inſtead of burning away a part of the ſoil, all the addreſs of the farmer ſhould be employed to encreaſe its quantity. If this gentleman had laid on pond mud or marle, he would have obtained great crops, and laſting benefit; and there would have been more honour in deſerving the premium that way, than in winning it the other; it would have ſet an example, which they who had followed would have at once enriched themſelves, and ſerved their country. It is a great honour theſe ſocieties do to the preſent age, but nothing is perfect in its firſt eſtabliſhment. It was an ideal wiſdom that came perfect from the head of Jove: in human things, time and experience bring this finiſhing excellence. Hereafter we may hope the means will be conſidered in the diſtribution and appointment of premiums, and the laſting good of the country provided, rather than the particular benefit of an individual.

In regard to the burning of ſoils, the rule is abſolute and plain to reaſon. The deep ſoils will bear it better than the ſhallow; and it ſhould never be permitted but in bad grounds, nor ever without a covenant of certain dreſſings afterwards.

CHAP. LIX.

Of the application of dung.

IN the dunging of paſture grounds, beſide the general direction of breaking the heaps, and ſpreading them evenly on the ſurface, it is a very good rule to bring none near the hedges. The omitting the manure to the breadth of eight,

eight foot from every hedge, will conſiderably reduce the quantity, eſpecially in ſmall encloſures, and conſequently leſſen the expence; and the graſs will ſuffer no damage for the want of it in thoſe places; becauſe the cattle will do the buſineſs for their owner.

Theſe creatures love to lie under the hedges; and the warmth and perſpiration of their bodies, with the dung and urine which they drop principally in theſe places, becauſe they are moſt of their time there, will very well compenſate the omiſſion of dung laid upon the other parts. It is a common obſervation, that the graſs is more rank near hedges than elſewhere, and this is the reaſon: the farmer gives this part of the ground the ſame quantity of manure with the reſt; and the cattle give it ſo much more. He will, by the practice we direct, ſave a great deal of expence, and make the produce equal.

Not only the nature of dung differs according to the various animals from which it is produced; but the dung of the ſame animal is different under various conditions, according to its ſtrength and ſituation.

Phyſicians who preſcribe horſe dung on certain occaſions, always are particular in directing that it ſhall be the dung of a ſtonehorſe. The creature in that condition having more ſtrength and vigour, and conſequently the dung having more virtue.

We know that the nature of the food, in a great degree, determines that of the dung; and it has been ſuppoſed that the dung of the ſtonehorſe was better than that of other creatures of the ſame ſpecies, becauſe he was in general better fed than they; but we ſee by the farmer's experience, that the dung of the ſame creature feeding upon the ſame food, will be of a different quality, according to the ſtate of the animal's body.

It is known, that the dung of horned cattle is much poorer and colder than that of horſes; yet that of the ox is preferable to that of the cow. Bulls are kept in ſmall number, ſo that their dung cannot be ſaved or tried ſeparate, elſe doubtleſs it would be found better than either. But this is not all: the dung of a cow which is fattening up for the butcher, is much richer than that of a milch cow. This laſt is the pooreſt of all; and repeated experience ſhews that it ſcarce takes any effect upon the land.

The dung of ſheep being naturally hot, that of ewes is preferable to the dung of weathers. The richeſt ſheeps dung of all is that when the ewes have the lambs in them; and in general, it is with the ſheep as with other creatures; the more dry food they have, the finer and more valuable it is. The improvement of this dung, by means of loamy or other earth in the cover'd fold, we have named; and ſomething of the ſame kind is advantageouſly performed with pigeons dung in many places. They ſtrew a large quantity of malt duſt on the floor in the dove-cot, and when this is well covered with the dung, they throw on more. They thus double, or perhaps trebble the quantity of manure, and render it more eaſily manageable, without greatly impairing its value. We name this for the ſake of an improvement, which has been lately made in the practice, and which, without abuſe, may be of great value. A gentleman in Suſſex, who depended very much upon his pigeons dung, found his dove-cot empty day after day, not only of dung, but of the pigeons themſelves. Some neighbour more wiſe than honeſt, had found the art of decoying them away. He had read of the fondneſs theſe creatures have for cummin ſeed, and he mixed a conſiderable quantity of this in powder among the malt duſt, which he ſtrewed upon the floor; he moiſtened this with ſtrong brine, and left it to its conſequences: the few pigeons which yet came to his dove-cot returned the next day with more; the number encreaſed from time to time much faſter than it had diminiſhed; and though, without his deſire, he ſoon ſeemed to have more pigeons than properly belonged to him.

The farmer needs not be told that cummin ſeed and brine can do no harm to the manure: what effect they have will rather be in the way of enriching it. This is a method one would by no means wiſh to ſee practiſed to an ill purpoſe; but ſome art is needful to thoſe who live among ill neighbours.

There need be no limitation in the quantity of malt duſt, for that is in itſelf an excellent manure. When it is uſed alone, the quantity ſhould be twenty buſhels to an acre. The time for laying on is February, when the wheat is making its ſpring ſhoot; it will thus give a laſting virtue to the land; and though it have been neither dunged nor folded, the wheat will be a good crop, and it will be capable of bearing barley afterwards. Cold clayey ſoils get the moſt good from this manure; and it is of equal value for theſe ſoils, whether they be in paſture or tillage. The time to ſay it on in either caſe, as near as the farmer can gueſs, before rain; for if a dry and windy ſeaſon follows, the ground will have ſcarce any advantage from it. The time we have directed for laying it upon the ſpring corn favours this, for there is much more reaſon to expect rain than heat at that ſeaſon; and wind without heat will do little damage.

For graſs grounds it muſt be laid on a little later: the time when they are going to be laid up for hay is very proper; and if it be done before the laſt rolling, it will be the better, for that will preſs this light ſubſtance cloſe to the ground, which will have the double benefit of preſerving it from winds, and expoſing it to the rain.

CHAP. LX.

Of the management of wheat ſtraw.

THE farmer will ſucceed beſt who regards all articles in time; and makes proviſion in abundance for ſeaſons of deficiency. This is to be extended even to the leaſt articles, not only to his corn but his ſtraw: particularly to wheat ſtraw, which has many excellent uſes beſide the common ſervice to which it is applied; and is much fitter for many of thoſe purpoſes in ſome years than others.

Wheat ſometimes runs very much into ſtraw, and leſs into ear; at other ſeaſons the ears are in general large, and the ſtraw is ſhort: often alſo it is blighted or otherwiſe damaged.

In thoſe years when ſtraw is long, ſound and fine, it ſhould be ſaved for ſeaſons when there is little or none good, and when it will be much wanted. It is worth while to rick it on theſe occaſions; and it will keep ſo, good two or three years. At the end of this time, what has not been wanted for better purpoſe, will ſerve excellently as litter for dung; becauſe, though it keeps its firm coat all that time, it will rot more readily and more perfectly by means of the fermentation with the dung and urine, than it would have done while freſh.

The uſes of good wheat ſtraw are very important.

When peaſe or barley are obliged to lie any time in the rick unthatched, a few loads of this thrown over them anſwers the purpoſe.

In preparing ſtraw for thatching, there is a neceſſity of watering it in ſuch a manner as to make it ſupple in the hand, and diſpoſe it to lie cloſe in the place; this is often done very imperfectly, and in conſequence the work is of little duration. There is no way to make the ſtraw take wet well, but by beating it in the heap while it is ſprinkled. This muſt be done with a careful though a free hand: for if it be done irregularly or lightly, the purpoſe will not be anſwered; and if it be done too roughly, the knots will burſt, and the ſtraws crack between them; and the thatching will decay much ſooner than its natural time.

In the laying on the thatch it is cuſtomary to uſe withs of oſier twiſted to bind it; but there is in many places an opportunity of a much better practice, where old ſea ropes are to be ſold, as they are in many parts of England, theſe being tarred will bear untwiſting, and they are then much fitter than the withs for that ſervice. They will bind faſter, which is often of very great conſequence, and they laſt much longer, which always is ſo.

CHAP. LXI.

Of foddering of cattle.

HARD winters bring on a neceſſity of this expenſive article; and the farmer ſhould be upon his guard to delay it as long as he can with ſafety to the ſtock; not only becauſe all that time is ſaved in the price of fodder, but a great deal more; for when they have been accuſtomed to fodder, they will not make ſhift with the ſame food that would have ſerved them, if they had not been brought to the uſe of this. Therefore it is eſſential to keep them from it as long as can be done without abſolute damage to them; and when it is firſt given them, to let them feed partly on that, partly on what freſh meat remains. There is a great deal to be ſaved by this cautious management; and the farmer's ſavings are his beſt gain.

The cheapeſt hay is alſo propereſt for this purpoſe, for the ſame plain reaſon: no farmer would by choice feed his cattle upon what he could readily carry to market; but in this alſo, a great deal depends upon right management. When the cattle find great ſcarcity abroad, if they be offered ſome of the moſt indifferent hay, they will feed gladly upon it; but if he begins foddering with what is better, they will not readily touch this afterwards.

Another rule, in regard to this indifferent hay is, that he give it a little at a time only, and that when they are ſharply hungry. For if he give them a ſurfeit of it they will never touch it afterwards. If he force it upon them, in the ſame manner, when they are indifferent about eating, they will diſguſt it; and refuſe the ſame food afterwards, even when they are hungry.

When we adviſe the farmer to uſe an inferior kind of hay for fodder, we do not mean that he ſhould make ſtuff into hay, for this purpoſe, which is unfit for it; or that he ſhould give bad food to valuable beaſts: which is often attended with very ill conſequences. Moderation is the rule in this as in all his other proceedings. If he ſhould give ſour, muſty, ruſhy hay, to creatures that had been accuſtomed to better food, they would fall into diſorders; and perhaps die by it.

Theſe, which we have laid down, are the abſolute rules, but he muſt follow them with diſcretion.

Cows will eat ſtraw freely, and thrive very well upon it, unleſs they be accuſtomed to hay; but in that caſe they will refuſe the very beſt ſtraw afterwards; and the farmer muſt ſubmit to feed them in this expenſive manner, or to ſtarve them.

He muſt not expect cows to eat after one another, or that one creature which chews the cud will eat what another has left; but the leavings are not waſte, for though theſe will not eat them, the other kinds will.

A great deal of caution muſt be uſed in regard to the time of turning cattle out of the yard where they have been foddered, into graſs; for if there be not a ſufficient growth for their ſupport, they will decline very ſoon. It is a common error to turn them out too early. The farmer, if he will uſe his eyes, knows when there is and when there is not what may be ſufficient for them, and he ſhould ſee that there is before he leaves them to truſt to it.

When froſts come on in the beginning of winter, and the graſs in paſture grounds hangs covered with a white rime very late into the morning, the farmer ſhould fodder his cattle early, that they may not be tempted to eat the graſs in that condition. It is not wholeſome for them; and nature, their true director, gives them a diſtaſte to it; but hunger, too powerful for the voice of inſtinct, often is obeyed; and they are extreamly hurt by it. While the farmer is attentive to them, ſome part of the miſchief will be avoided, for if they have a little dry food early, they will be patient till the remainder of the white froſt is melted off by the ſun, and they will then eat with freſh appetite: for this icy matter which is hurtful while it is on the leaves, is of great uſe as it melts, giving the blade freſhneſs and the roots an immediate ſhoot for growth.

We have obſerved that there muſt be great care in the firſt giving this dry food in winter, becauſe when the foddering is begun, the cattle expect it ſhould be continued; but in this method of giving it a little at a time and early, there is no danger; for the freſh bite of the graſs ſoon after is ſo pleaſant, that they are at leaſt as well pleaſed with it as with the fodder, and conſequently do not long after it as on other occaſions.

In the choice of ſtraw for fodder, the farmer ſhould always prefer that of the lateſt crops. The longer the crop has ſtood upon the ground, the more juices the ſtalk may naturally be ſuppoſed to have drawn, and the later the harveſt is got in, the leſs power there is in the ſun to exhauſt the ſmall remains of juices in the ſtalks as they lie upon the ground. This, which is the teſtimony of experience, reaſon alſo confirms.

There are kinds of grain that require but three months in the ground from the ſowing of the ſeed to the ripening of the ear, and ſome even leſs than this: in theſe kinds it is plain that the ſtalk cannot attain that perfection and ſtrength, that it will have in ſuch as are nine or ten months in growing. Accordingly we find the ſtraw of theſe ſeveral kinds valuable nearly in proportion to the time of their growth: that of leaſt value among the better grain, is the ſtraw of the rath ripe barley.

The obſervation is not limited to the corn kinds, but we find it even in pulſe. The vetches which are ſown for fodder, ſhould always be of that kind which is known by the name of winter vetch or thetch; for the ſtalks of theſe have incomparably more ſtrength and nouriſhment in them than thoſe of the ſummer kind; the caſe is the ſame as between the corns which take a long, and thoſe which have a ſhort growth. The longer the ſtem of a plant lives, and the more nouriſhment it receives, the better it will be at the laſt in drying.

This is moſt plainly the caſe in thoſe kinds of plants, wherein the ſame ſpecies may be ſown in autumn or ſpring; for then the ſeaſon of ſowing, as it gives the time of the plants remaining in the ground, gives alſo the ſtrength or weakneſs of the fodder. The ſummer and winter vetch differ only in this circumſtance; for the ſpecies is the ſame in both: yet we ſee the conſequence, that which has grown through winter has more than twice the ſtrength of what has been produced in ſpring. This muſt not appear wonderful to the botanical enquirer; for the diſtinction between annual and perennial plants is not ſo abſolute as many imagine. The ſame plant that is annual here is often perennial in its own country; and we find in gardening, that many of the plants which are found to be annual with us, will yet be produced from cuttings; which ſhews that they are ſo far of the perennial kind, that if they do not exhauſt themſelves by flowering, they are very well able to ſtand through our winters.

In the giving cattle fodder in the fields, the beſt method is by means of moveable racks: for the dung of the cattle is by that means ſcattered over the ground as regularly as can be deſired; and this ſort of foddering is like folding of ſheep. This is the more worth conſideration, becauſe the dung of the ſame cattle, when fed by the rack upon dry food, is richer and capable of doing much more good to the land, than when they feed only upon graſs.

The value of the long ſtraw we have mentioned for thatch and other purpoſes of a like kind: and it is a lucky circumſtance for the farmer, that cattle always prefer the ſhorteſt for fodder. This gives him an advantage, if he will attend to it, of uſing the different kinds, and all to advantage.

Another uſeful remark is, that cattle never fail to prefer freſh thraſhed ſtraw to ſuch as has been thraſhed ſome time; and it is always found to afford more nouriſhment. The reaſon of this is, that being bruiſed and broken by the flail, it is eaſier to be worked upon by their ſtomachs. This is worth regard, becauſe the thraſhing and foddering ſeaſon naturally enough fall out together, and he muſt be very negligent who does not make the moſt of a known advantage, when it ſo naturally and readily offers itſelf to him.

CHAP. LXII.

Of the uſe of oat ſtraw as fodder.

OAT ſtraw has fallen into diſrepute on this occaſion; but without any real cauſe: thoſe who have found its bad effects need only have given it in a careful manner, not have left it off entirely.

There is no ſtraw ſo tough as that of the oat, and accordingly

cordingly it is found to looſen the teeth, hurt the mouth, and take off the ſtomach of creatures that are fed with it conſtantly.

It is not like other diſagreeable fodder in this reſpect. For the worſt of thoſe only give the creature a diſguſt to that kind, and it will readily enough feed afterwards on any other. But oat ſtraw makes them loath all food, and has many times thrown them into very miſchievous diſorders.

The method to be obſerved is, to give this not conſtantly or alone, but at times, and mixed with other food. There is one particular mixture which is now found very advantageous. This is the mixing whirm or furze with oat ſtraw in fodder, the ſharpneſs of the furze aſſiſts in digeſting the toughneſs of the ſtraw.

The method of uſing furze for the food of cattle has been long practiſed in Wales, but is very lately brought into uſe in England. The furze is to be ſown for this purpoſe, and cut while it is very young and tender. The worſt ground will ſerve for raiſing it; and being ſown in the latter end of March, it will be ready to cut for this ſervice in October.

It muſt be chopped ſmall and bruiſed; and then mixt with cut oat ſtraw. The furze alone is a very good food; ſtrengthening the creature more than almoſt any thing of that kind, but it does ſtill better with a mixture of oat ſtraw; for theſe two things ſeem mutually to render one another fit for the ſtomach. The food of cattle is an article of ſo great concern to the farmer, that he ought to be attentive to every thing that is propoſed for rendering it cheaper. This is one of the new crops which he will do well to introduce into his ground: The pooreſt land will ſerve for it, therefore it is raiſed at ſmall expence; and the uſe of it as fodder in itſelf, and eſpecially as preparing the oat ſtraw for that ſervice, is very conſiderable.

The better the ſoil is, on which a crop of corn has grown, the better and richer will be the ſtraw for fodder. It is obſerved univerſally, that the ſtraw of barley, which has grown on one earth, as they expreſs it, is poor and will ſtarve cattle that are kept ſtrictly to it; and the reaſon is plainly, becauſe it is on poor and light lands they ſow barley in this manner.

What juices theſe lands afford, are carried up at once to the ear; ſcarce any remaining in the ſtem; which ſerves as a mere machine for the conveyance of them to the grain. This is the proviſion of nature for the grain, and it is happy for the farmer, that where the nouriſhment is ſcanty it naturally goes thither: but in this leſſer concern of the ſtraw, he ſhould know that it is left very defective for the ſame reaſon: we would have him underſtand juſtly and exactly every part of his profeſſion, and every article of his produce, that he may never place more dependance on any thing than it will bear. This is the way never to be diſappointed.

The food of horſes in particular is grown to an exorbitant price at this time, and it is the farmer's intereſt, in the higheſt degree, to uſe every thing he can in the place of oats, without damage to the creature.

It is worth his while to conſider this in the management of his pea crops, for if pea ſtraw be well got up and houſed, eſpecially the ſtraw of the large and late ripe peaſe, it becomes an excellent food for horſes. But this depends ſo much upon the management of the crop, that it is not to be expected unleſs due care be taken.

Bean ſtraw will alſo go down very well with horſes, and is good nouriſhment, but it all depends upon the management; for if this or the other be ill cured, and left to grow wet and dry, muſty and mouldy, and rotten; the horſes, if uſed to better food, will not taſte it; and if, from being accuſtomed to coarſe living, they will be contented to feed upon it, they will fall into diſorders: and the farmer will find it would have been cheaper to have fed with his beſt oats, than by this means to have endangered the lives of his horſes, loſt the preſent uſe of their labour, and entailed upon himſelf the expence of farriers bills.

We ſee how eager the cattle are to crop hedges and eat the leaves of elm and other common trees in thoſe plantations. This may give the farmer a uſeful hint, and to all ſuch he ſhould attend; for his great profit will ariſe from making the moſt of every thing.

When he has occaſion, or a reaſonable opportunity to ſhrowd or lop elms in the leaf ſeaſon, let him carefully lay up the ſhrowds or branches with the leaves upon them. The cattle do not want them then, but there will come a ſeaſon when food will be ſcarce, and theſe will then prove of excellent ſervice. The creatures will be glad of them dry as well as green, but for this purpoſe it is neceſſary they ſhould have been dried carefully. If they are left to grow muſty upon the branches, they will be diſagreeable to them, and will be liable alſo to throw them into illneſſes. The care to dry them wholeſome is comprized in a few articles; and the method of keeping is eaſy. They muſt now and then be turned till the leaves are dry, and they muſt be kept under cover till they are wanted. This trouble is all that is required, and the reſt is profit; for the wood will anſwer all purpoſes as well as if it had never been put to this firſt uſe.

There are even weeds, which are avoided by cattle while they are growing, which, by a very little management, become a good food.

The thiſtles of our paſture grounds are of this kind; and particularly that called the ſpear thiſtle. This firſt makes its appearance in a number of long prickly leaves, which riſe in form of a ſtar, and one plant will cover a yard of ground; ſhading, preſſing down, and damaging the ſoil for that compaſs; the cattle will not touch this, and there are many paſture grounds, where an eighth part of the ſurface is occupied by theſe plants.

There is a very eaſy way to render them a benefit inſtead of a nuiſance. The cattle do not refuſe them becauſe ill taſted, but becauſe they are prickly; and their noſes are wounded in attempting to eat them. Let them be cut up in this ſtate, and as ſoon as they begin to wither, the prickles loſe their ſtrength, and the plant may be eat without trouble. Its own juices then recommend it, and thoſe creatures will feed on it with pleaſure, which before avoided it though hungry. The time when they are between green and dry is the moſt favourable for this, and that is eaſily ſeen. The prickles, which were the thing that rendered them unfit for eating, are then withered and weak, but when the leaves have lain to dry, theſe harden again, and will be able to wound the mouth as they did at firſt. Every one has obſerved, that between freſh and dry there is a ſtate wherein all the parts of a plant are weak and flaccid: it is at this time the thiſtle is eatable; and only the young leaves then.

CHAP. LXIII.

Of the uſes of plants hitherto unregarded.

THE antients, who had always utility in view, conſidered the qualities of plants much more than their forms; and botany was ſubſervient to purpoſes of the higheſt importance: in later ages, more ingenious but leſs prudent, the ſcience has been cultivated, and its end, in a great meaſure, forgot. We have informed ourſelves of the names and characters of plants, in regard to claſſical diſtributions, in a way much ſuperior to the antients, but this has engroſſed, in a manner, all the attention of thoſe who ſtudied them; and while thouſands have been added to our catalogues, little has been known of the uſe, either of theſe or of thoſe deſcribed before.

At preſent, diſcretion ſeems to promiſe again to blend itſelf with ſcience, and we ſee in Sweden, where the greateſt improvements have been made in it as a ſyſtem, the higheſt attention is now alſo paid to it in regard to uſe: the French have caught the ſame fire; and even in Ruſſia, the advances of knowledge, vaſt and unexpected as they are, have always utility alſo in view.

One branch of it has fallen into the way of the authors of this work, which they have endeavoured to improve, certainly with an attention proportioned to its importance; with what ſucceſs the world will judge.

Hints had been given by others of the value of certain plants hitherto little regarded by huſbandmen; and obſervation pointed out the plain utility of others: experiment was wanted to confirm theſe opinions, and the correſpondence, with which they have been honoured in conſequence of the work, by thoſe who ſtudy agriculture in various parts of the kingdom, has given them this opportunity.

The experiment, propoſed in a former part of this book, of raiſing ſea ſpurrey for the feeding of cattle upon the beeches, where nothing elſe would grow, has been attended with ſo much ſucceſs, that the authors have been encouraged from it to make repeated obſervations on other plants, which may be introduced in the ſame manner; and to ſeek throughout the writings of others, of earlier or later date, for obſervations of a like kind. Thoſe, however lightly delivered by thoſe authors, have, in many caſes, been brought to trial: and where they have been ſucceſsful, they will be here recommended to general uſe. Others alſo will be propoſed for trial, from a knowledge of their qualities, and an eaſy way pointed out to uſe them. We ſhall be happy to make the ſtudy of plants, in this manner, uſeful to the publick, and it is thus we rationally are to look for improvements: nor let the novelty be an objection; every thing was new once: clover has indeed been ſo long uſed, that the huſbandman looks upon it as a natural part of his crop, like graſs; but ſaintfoin and lucern, additions ſcarce leſs valuable, are, in England, of very modern date.

Nor let the botaniſt think the ſcience diſgraced by our conſidering this as its firſt value. The uſe of plants in food and phyſick, cloathing and building, firſt occaſioned men to ſtudy them; and it was for the ſervice of theſe purpoſes alone, that they were conſidered by thoſe fathers of the ſcience, whoſe names we hold in ſo much reverence: Theophraſtus and Dioſcorides knew but a few; and were little ſkilled in the botanical characters even of thoſe, but they underſtood their uſes perfectly. If they had better deſcribed them, their writings would have been of much more value, and that deficience we ſhould ſupply now.

Theſe uſes of plants thus firſt gave credit to the ſtudy of botany, and we ſhould, now we have ſo much improved the ſcience, ſhew its value in the ſame manner; by aſcertaining ſome, and by diſcovering others.

Even the claſſical diſtributions of plants may become uſeful to the phyſician and the huſbandman; for all thoſe which are truly of the ſame claſs, are alſo of like qualities.

This abſolute truth ſhould raiſe the ſcience into very high eſteem; for it points out a value in it more extenſive than might have been imagined, giving the farmer and phyſician at once, a view of many plants, which they may rationally bring into ſervice.

We have not yet arrived at a truly natural method of claſſing plants, but we make ſwift advances towards it: this will perfect the ſcience, and will ſhew it to the world in a high point of view, as to its uſe. So far as we have fallen upon the true diſtinctions of nature, the virtues of all thoſe of one claſs are alike; and knowing the uſe of one, we are rationally led to thoſe of the others.

Thus all the truly leguminous kinds are eatable; and it is the ſame in many other inſtances: the graſs kinds are diſtinguiſhed by characters ſo peculiar and obvious, that no true botaniſt can rationally ſeparate them, and theſe all poſſeſs the ſame qualities. Their leaves and ſtalks are the food of cattle; their ſeeds of birds, and occaſionally of the human ſpecies. CANARY SEED is an inſtance of the firſt kind, MILLET and PANIC of the latter. The graſſes of a ſuperior order, which, from the largeneſs of their ſeeds, we dignify with the name of corn, are the ſupport of the human ſpecies. Darnell ſeems an exception, but it may alſo be made eſculent. The leaves of the leguminous plants are eatable for cattle as well as the ſeeds; and this might have pointed out early the uſe of lentils, to thoſe who were acquainted with the tare: yet was that valuable crop long neglected. The common clover, which is a leguminous trefoil, might naturally alſo have introduced the lucern, and the reſt, much earlier than they were. It is indeed ſtrange upon a double ſcore, that theſe were neglected, for they had not only the ſtamp of nature upon them, but the ſanction of antiquity.

We are yet ſo far from a perfectly natural method in this ſcience of botany, that even Linnæus, who has done more than all others for its improvement, ſeparates the graſſes according to his artificial characters, into various, not only diſtinct, but remote parts of his work: theſe are the imperfections of the ſtudy, but they will be removed, and he will deſerve ſtill more honour among its profeſſors, who, while he purſues this point, keeps alſo in his mind at all times, that which is moſt eſſential, their real uſe: examining what kinds, in various countries, are uſed for food or drink, for phyſick or for other purpoſes of ordinary life, down to the utenſils of huſbandry.

If this had been at all times in the thoughts of botaniſts, we ſhould, by this period, have been enriched with many uſeful additions to the common articles of life; for the remoteſt parts of the world have been ſearched for plants, and multitudes of ſpecies are well known; but not always their uſes. *Hermon* has laid the herbs of *Ceylon* before us, and *Rumphius* of *Amboyna*, *Van Rheede* of *Malabar*, *Kempfer* of *Japan*, and *Alpinus* of *Egypt*; *Oldenland* has added thoſe of the CAPE, and *Feuillee* thoſe of *Peru*, *Hernandes* thoſe of *Mexico*, and *Marcgrave* of the *Braſils*; *Plumier* has acquainted us with thoſe of Saint *Domingo*, our own *Cateſby* with thoſe of *Carolina*, and *Clayton* of *Virginia*. *Tournefort* added *Greece* to the diſcovered places of plants, and in *Europe*, *Ray*, *Haller* and *Linnæus* have given us a moſt perfect knowledge of thoſe of *England*, *Swiſſerland*, and *Sweden*.

Theſe are the kingdoms through which ſcience has travelled in this inſtance, and tho' utility has not been the great point with any of thoſe, to whom we owe theſe additions to curious knowledge, all of them have not neglected it. Much may be gathered from their writings, and particularly from thoſe of the three laſt, which it will be very uſeful to apply to practice. This is the purpoſe of the ſucceeding chapters; and we ſhall be happy, if from the advantageous conduct of the reſt of the world, we can add any thing to the wealth and proſperity of Britain.

CHAP. LXIV.

Of the herb LADIES MANTLE *to be uſed for food of cattle.*

ONE of the great articles we want in huſbandry, is an artificial graſs for unfavourable hilly paſtures: theſe, in general, bear a ſhort ſweet graſs, and are in great eſtimation for feeding, eſpecially of cattle that have got injury in wet grounds, but the quantity is ſo ſmall that they produce, that it by no means anſwers the farmer's expectations. Clover does not ſucceed well in theſe grounds, for there wants nouriſhment to give it any large growth, and hitherto, no better method is known in England to improve them, but by the addition of manures: which they receive very ill, and which their very ſituation renders frivolous, becauſe the next rains carry them off. The roots of the ſmall crop, which grows there, not being enough to entangle and preſerve them.

For this purpoſe, in Sweden and ſome other of the northern kingdoms, they ſow the plant ladies mantle alchimilla. Linnæus and his diſciples have done vaſt ſervice to that country, by a careful obſervation of what they ſaw uſeful or hurtful among its products; and to them, probably, has been owing the introduction of this plant into the Swediſh agriculture. They obſerved that large cattle were fond of it; that they fattened well in thoſe lands where it was moſt common, and that the cows gave better milk. This they learned from the farmers of the country in their travels, and they recommend its culture. The farmers could tell them what paſtures had this effect; and it was their turn then to acquaint the farmer to what the effect was owing. What appeared like magick to the huſbandman, was familiar to them, becauſe they immediately ſaw what plants were peculiar to ſuch paſtures as produced this effect; and to theſe it muſt be owing.

This reaſoning was plain enough for farmers to underſtand, and thoſe of Sweden were not ſo obſtinate as ſome in England: they cut the plant freſh who had it not in their grounds, and the conſequence was the ſame in the cattle to which it was given. They then planted it where it did not grow naturally, and it appears, by all accounts, that they have found great advantage.

This is not all the benefit they have received from it: Sweden abounds with bogs, on which grow water-pennywort and other plants, which give that deplorable diſorder, the rot, to ſheep which feed upon them. It has been cuſtomary there as well as here, to remove ſuch cattle into dry upland paſtures; but this will not always ſucceed where there is no farther aſſiſtance: it appears by manifold teſtimony, that the ſheep, turned into a ground where this plant is common, always are cured. Theſe creatures are fondeſt of the young leaves, juſt as they ſhoot from the root: the larger cattle eat the ſtalks; but the fineſt part of all is the flowery top, juſt when beginning to bloom.

Theſe are the advantages ariſing from this plant, in the limited uſe that has hitherto been made of it: but there is yet a great field open for improvement and more benefit. It is no ſmall merit that it will grow and produce large crops where little is to be expected from any thing elſe; but probably it will ſucceed as well in tillage as in paſture ground, and may prove an excellent addition to the number of our artificial graſſes: at leaſt, the experiment is eaſily made, and there is great probability of ſucceſs.

CHAP. LXV.

Deſcription of the plant.

LADIES mantle is a native of England as well as Sweden, and it thrives no where better than in our northern counties, where improvements are greatly wanting. It may be eaſily introduced thence into the other parts of the kingdom, where it is leſs common.

It is a perennial plant, very ſpreading in its growth, but of no tall ſtature, nor ſubject to run up into hard, uſeleſs ſtalks. The root is compoſed of many fibres; the leaves are large and beautiful; they grow ſingly on ſhort thick foot ſtalks, not by threes as in the trefoil kinds; and they are very tender, and well taſted. When fully expanded, they are as broad as the palm of one's hand, almoſt round, but running out into ſeveral corners, and notched very delicately.

When theſe firſt riſe from the root, they are folded together in a moſt elegant manner with long plaits and ridges, and lie in a ſmall compaſs. They keep thus a conſiderable time before they expand; and it is in this contracted ſtate they are moſt delicate and nouriſhing.

The ſtalks are numerous, ſo that the produce is very great; for they alſo are covered with leaves, and terminated by large flowery cluſters. They are about fifteen inches in length: but they never riſe perfectly upright, nor do they lie upon the ground; their natural poſture is ſlanting upwards, and one plant in a good ſtate will thus ſpread into a circle of nouriſhment, of half a yard in diameter. The leaves from the root will be very abundant, as well as the ſtalks, and with good management there will be a continual ſupply of food for a great number of cattle, from a moderate paſture.

The flowers are ſmall, and inconſiderable ſingly, but they ſtand in ſuch large cluſters, that they appear very conſpicuous. They are of a greeniſh yellow, and they are of conſiderable duration; for to ſpeak properly, they are rather cups than flowers, and are not of the nature of thoſe gaudy parts of plants which ſoon decay. The ſeed follows, and is in its nature nouriſhing, more ſo indeed than many other kinds; but there is no great quantity of it produced, and it exhauſts the plant ſo that it never ſhould be regarded, except when ſome of it is wanted for ſowing. For this purpoſe a very little of it goes a great way; and it will be proper to leave a few plants annually to ripen ſome for this ſervice.

It is an advantage in the growths of this plant, that beſide bearing the bleak expoſure of hills, it will grow very well where there is ſhade, and may therefore be uſefully ſown in thoſe paſture grounds bordered by woods; and toward the hedges of others where there are many trees, for it will find its nouriſhment not only in ſpite of their ſhade, but even among their roots.

CHAP. LXVI.

Of ſaving the ſeed.

THE ſeed of ladies mantle is not to be bought; for the ſeedſmen yet have no knowledge of the herb: therefore it muſt be ſaved from the wild plants. The curious, in ſome places, raiſe it in their gardens, but the ſeed of ſuch plants is not what we recommend to the farmer; neither that of all the wild ones.

What I have obſerved of the growth of the plant is this, where it riſes among thickets under hedges, or ſheltered by trees. The leaves are more numerous, the ſtalks taller, and the whole plant greener; but in theſe places the ſeed does not ripen favourably. In open dry places, toward the tops of hills, in the midſt of paſtures, and where there is no ſhade or ſhelter, the leaves will be fewer, the plant ſmaller, and it will be throughout of a yellow green; but it is under this leſs robuſt appearance, that the ſeeds are ripened to the greateſt perfection.

Let the farmer who intends to enrich his paſtures with this plant, mark ſome ſuch roots as theſe for ſeed. The plant flowers in June, and the ſeeds will be ripened ſix weeks after; they are green at firſt, but grow yellow as they ripen; and when they are yellow throughout, and hard, they are fit for ſervice. Let the plants be taken up with care, and the ſeed thraſhed out, and let it be ſpread upon a ſheet in an airy place, where there comes no ſun till perfectly cured; then let it be tied in a canvas bag, and hung up from the ceiling in an airy room, till it is wanted. This way it will be not only preſerved from vermin, but it will be kept in a good condition for growing; the principle of life is not ſo ſtrong in it as in many other ſeeds, therefore this caution is neceſſary.

Though there be more of the plant in the north of England than elſewhere, the ſeeds ripen beſt in the more ſouthern counties. There is more of it in the biſhoprick of Durham than elſewhere in England; but the moſt perfect ſeeds I have ſeen, were ripened in Hertfordſhire. Near Watford there is a good deal of the plant ſcattered in different places, and alſo about Leiceſter; near Andover in Hampſhire alſo, and in many other places: from ſome of theſe the ſeed ſhould be obtained, and, as in all new trials there is more hazard as to the ſucceſs than in others on plants more eſtabliſhed, too much care cannot be taken in this firſt article.

CHAP. LXVII.

Of ſowing the ſeed.

THE ſeeds of ladies mantle, when cured in the manner here directed, may be ſown either in autumn or ſpring, but the former is moſt natural, for it is ſo the plant is raiſed by nature, and there is great advantage in its having the winter for the new ſhoots ſtrengthening itſelf in the ground.

Nature makes no other proviſion for the encreaſe of the plant by ſeed, but ſcattering it by the winds among the graſs of paſtures; but I have found this a too precarious method to be followed by art. In the experiments I have made, few plants thus roſe from a great deal of good ſeed. I ſhould therefore adviſe opening the ground a little for it; or elſe ſprinkling it on largely juſt before the laying on of manure.

As in all new things, trials ſhould be made at the leaſt expence that can be, and this plant is yet altogether new to the Engliſh huſbandman, the following method may be adviſeable.

Let a piece of paſture ground be choſen that is of as little value as may be, and let it be of ſuch a kind as the plant naturally loves. If the farmer have a ſmall cloſe upon a hilly ſituation that is barren, over-run with buſhes and ant-hills, and bordered by a wood, let him chuſe this for the purpoſe; or let the land-owner incloſe ſuch a piece as this, ſo the ſoil be not abſolute heath. The value of ſuch a piece of land is very little, and whether the plant ſhould ſucceed on it or not, the culture, we are about to direct, will not be thrown away.

In autumn let the dreſſing of the cloſe be begun. Let the buſhes be drawn up by the roots, with the inſtrument we have deſcribed for that purpoſe in the preceding volumes, and let it be uſed all round the hedges. In neglected ground the hedges always encroach upon the paſture; the bramble drops its ends and takes root, and the black thorn produces ſuckers to a great diſtance; let all theſe be cleared away in the ſame manner as thoſe in the middle of the ground, and the paſture be thus reſtored to its original extent.

Next let thiſtles, fern, or other perennial weeds, be cleared away in the ſame manner; and laſtly, let all the ant-hills be cut down by means of the ant-hill plow.

Let the perſon, who performs this work, carry ſome of the ſeed of the ladies mantle in his apron. The tearing up the ſhrubs and perennial large rooted weeds, will break the ground a little; and in every ſpot where it is ſo broken, let him bury half a dozen ſeeds at ſmall diſtances; and at about a finger's breadth deep.

The ſurface will be left bare, where the ant-hills were cut up; and let him there ſtir it a little with a ſmall rake, and ſcattering on ſome more ſeeds, tread them in, and rake the ſpot again. Laſtly, let him go round near all the hedges, and eſpecially toward the edge of the wood, if there be one; and moving the ſurface a little with a trowel at different places, let him put into each ſome of the ſeeds. Let theſe be let in cloſe under the hedges, and on the ſides and edges of the banks of ditches by them. Weeds will grow there if not prevented; and there is no way ſo well as this, of raiſing a uſeful plant in their place. It will ſoon be ſtrong enough to deſtroy them. If there be a pond or hole of water, let the ſides and ſloping bank of that be alſo planted with ſome of the ſeeds; for this is an herb which will grow on almoſt all kinds of waſte ground. This done, let the remainder of the ſeed be ſcattered over the paſture, where there has been no opening made, and thus all left to nature.

The ſingle care requiſite farther is, that cattle be not turned in during the winter, for the feet of cows and oxen would tread down and deſtroy the young ſhoots; and ſheep are ſo fond of the firſt leaves, while juſt ſhooting, that they would gnaw them up roots and all. After this winter, the plants will be ſo well eſtabliſhed, as to need nothing of that care.

If that be true in larger works which I have ſeen in ſmall experiments, there will be a great many plants in the places where the ant-hills ſtood, and upon the banks, by the hedges, and in the places of the ſhrubs and weeds; but few in that part, where the natural graſs was undiſturbed. If this prove the caſe, ſome of the plants from the ant-hill ſpots where they grow thickeſt, ſhould be removed into places where they are wanted. Half a day's labour will do this in a ſmall cloſe, and if a rainy day in ſpring be choſen for the purpoſe, ſcarce one plant will fail growing.

As a great point will now be eſtabliſhing the roots, cattle ſhould not be turned in in wet weather. In June the plants will be got into flower, and the ground ſhould then be mowed. The hay, though ſmall in quantity, will be excellent in its kind; and after this the roots will not make any other vigorous puſh for flowering: they will be unexhauſted, and their produce in leaves and ſhoots of ſtalks, which may be eaten off while young, will be very great.

Thus is the paſture prepared at ſmall expence: and it becomes not only a valuable one for general feeding, but a relief of a very extraordinary kind for cattle, that have been rendered ſick by the rank weeds of marſhy grounds, and for cows, whoſe milk is either rendered bad by improper food, or grows deficient in quantity. We know the ſtomach muſt be in order, or it is impoſſible good milk can be produced; and there is a peculiar virtue in this plant, for diſorders of the ſtomach in theſe cattle. When they yield little milk, the quantity is found gradually to encreaſe, upon their taking this food; and when the bad quality is more the caſe, the quantity will ſeem leſſened at firſt, but it will immediately grow better in quality; and from time to time the quantity will afterwards encreaſe, till there will be at leaſt as much of the good milk, as there was of the bad: and the amendment will continue.

This is of great conſequence to the farmer, who uſes his milk in his own dairy. When it is for ſale, the quantity is more regarded than any thing; but it is otherwiſe when the butter is to be made at home. Farmers at all times have known, that the food of the cow had great effect on this; but they have not always gueſſed at the true cauſe. They have thrown the praiſe ſometimes on one plant, ſometimes on another; but there is none equal to this, nor can any thing be eaſier than raiſing it in due quantity. Whether it would ſerve alone, is a point yet to be determined. What we know of its effects, is in a mixture with graſs; but it may be raiſed ſingly in fields, and the experiment is very well worth trial.

CHAP. LXVIII.

Of the management of the paſture of this plant.

AFTER the firſt year's growth, nothing can hurt the ladies mantle: but there are many things that may aſſiſt its growth: and this is an article worth attention. The dung of cows, though cold in its nature, agrees very well with this plant; but of all things which promote its free growth, that mould which is dug from under the bottom of an old wood pile is the principal. This we have adviſed the farmer to uſe on his paſture ground in general, for it favours growth of all paſture plants, and in particular of graſs and trefoil; but there is a peculiar reaſon why it is excellent in this reſpect for the ladies mantle, which is, that one of the natural places of growth of that herb, is in coppices and low woods, where the broken branches rot upon the ground, and afford a peculiar kind of natural manure, which favours certain plants. Wood betony and ſanicle are of this number; and ladies mantle, though not limited to wood ground only, never flouriſhes better than when it has chanced to ſow itſelf by one of the road ways, in ſuch a wood; where there is air, and this particular nouriſhment.

For theſe reaſons let the farmer procure a quantity of this manure; and in autumn, when the cattle are taken off to give the paſture time for a new ſhoot, let a ſmall quantity of this be ſtrewed over the places where the ladies mantle grows. It will not be wanted under the wood ſide, or cloſe to the hedges; for there nature ſupplies the ſame aſſiſtance: but in the open parts of the ground, where the ant-hills have been cut up, let this be done, and it will be worth while for the firſt time, and while the plants are young, to lay it on tenderly by hand, that the heart of the plants be not covered. A few ſhowers will waſh in its virtue, and by that time the natural graſs has recovered itſelf, this will be in good condition again.

Ladies mantle is green all winter, and naturally ſends up freſh ſupplies of leaves as the old are eaten; but it will do this more fully, after the manure we have directed; and the paſture will recruit itſelf after feeding in a ſurpriſing manner, not only for quickneſs, but for quantity.

In feeding countries it will be adviſeable, if the method proves as ſucceſsful in England as in Sweden, to have a certain number of theſe paſtures to be eaten in ſucceſſion; that when the cattle are turned out of one into another, there may be time for a new ſhoot of this quick growing plant, without any neceſſity of eating it down too low.

How far it will ſucceed as hay, is another article not yet determined by experience, but there is all the probability in the world that it will anſwer excellently in this caſe: there ſhould be only one crop cut in the ſeaſon; all the reſt fed down. The ſummer crop for hay muſt be cut juſt when the plants are at their full growth, they and the graſs together; and after this, the plants will be eaſily kept to leaves only; for the ſhoot for a ſtalk and for flowering, is naturally made only once in the year, and that is the only time when it is puſhed forcibly: for the reſt, if the young ſtalks be eaten down once or twice, juſt when they would make the ſecond and third attempt, all after this will be ſpent in leaves, of which there will riſe cluſters after the third or fourth year, as much as a buſhel would cover from every root.

The farmer who ſhall be induced to try this plant, ſhould watch, by the condition of his ſtock that feed upon the paſtures where it is raiſed, what proportion of the ladies mantle does beſt among the graſs: for I am inclined to believe, from all I have read or ſeen, that this plant ſucceeds better, at leaſt for milch cows, when it is eaten in a certain proportion with graſs, than abſolutely alone.

Experience and obſervation will be the beſt guides in this matter; and when this juſt proportion is once known, the plant will be eaſily kept up to it; for when there is once a quantity of it eſtabliſhed, there will always be new plants riſing in the field, which may be pulled up or ſpared according to that direction.

CHAP. LXIX.

Of the care and management in ſucceeding years.

LADIES mantle increaſing very faſt at the root, the ſeveral tufts will in time exceed the bigneſs we have mentioned; and when they are too much enlarged, the outſide only will be good, the middle of the tuft producing leſs; and what it does, inferior in its nature.

The ſame thing occurs in gardens; where the perennial rooted plants would ſoon be choaked up with their own abundance, and loſe a great part of their beauty, did not the gardener take them up and part them. This would be too much trouble in a field; and it is not neceſſary: there is another way more eaſy, and more beneficial.

It will not be till the ſixth or ſeventh year that the plants will any where be encreaſed to this improper ſize; and it will be then principally on the places where the ant-hills ſtood, becauſe there each tuft is compoſed of ſeveral others.

In the autumn of that year, let theſe large tufts be pulled up entirely; a proper reſerve of others having been made, to ſupply the place of them; and let the new broken mould upon thoſe ſpots be ſown with hay-ſeed of a proper kind: beſt of all, if from the hay of the ſame or ſome like paſture. The baldneſs of theſe ſpots will laſt but a little while, and the graſs that grows from the ſeed ſown upon them, will preſently overtake the reſt. The upper coat of the mould, which is the principal part into which the roots of graſs run, has been in a kind of fallow under the ſhade of the ſtalks of the plants which grew there, whoſe roots went deeper for their nouriſhment, and the new growth upon them will be very vigorous for that reaſon.

One article there is we have not yet named in the oeconomy of this plant, which is, the ſaving ſeed from the paſtures thus enriched with it; but a very ſhort inſtruction will ſerve that purpoſe. How nature forms the moſt perfect ſeeds of it, we have ſhewn; and in the parts of ſuch a paſture moſt ſuited to that purpoſe, that is, in thoſe parts which are moſt open to the ſun, a certain quantity of the plants ſhould be reſerved for that uſe. This muſt be done by fencing them in with hurdles from the beginning of May, till the time when the ſeed is perfectly ripe: they are then to be cut as we directed under the firſt head, and that part of the paſture will be ſoon in the ſame condition with the reſt. To promote this, it may be proper, as theſe particular roots have been moſt exhauſted, to ſprinkle over them, when the plants are taken off, ſome of the wood-pile earth before directed.

Horſe dung is the common manure of paſture ground in the neighbourhood of great towns, where it can be had in ſufficient quantity; but it ſhould not be uſed to thoſe paſtures where ſo much dependance is had upon this particular plant; for it is againſt its nature. Nothing is ſo well ſuited to it, as the dung of large cattle. That of ſheep would be too hot alone; but when theſe, and cows or oxen are fed upon it alternately, the coldneſs of one of theſe dungs moderates the heat of the other, and the whole very well anſwers the purpoſe.

Theſe are the beſt directions which we are yet able to give; but they are very imperfect in reſpect of what may be done hereafter, if the plant ſhould get footing in England. However, ſuch as they are they cannot miſlead: they are founded upon the nature of the plant, and what is known of its culture in Sweden; and they are ſufficient till more of it is known.

CHAP. LXX.

Of the bur-reed.

WE laſt treated of the culture of a plant, ſuited by nature to give additional richneſs to high grounds; but theſe are not the only kinds of land capable of improvement by the introduction of herbs ſuited to them; and fit for the purpoſes of feeding. The loweſt, wetteſt, and moſt marſhy ground, is capable of a very eaſy amendment upon the ſame principle; and the plant we are about to recommend for that purpoſe is a very common one, though neglected. Obſervation has ſhewn in other countries, that it is uſeful in this reſpect, and thoſe, who have ſeen this, have propagated it in ſuch places. The advantage is not ſo great as in the preceding inſtance, but neither is the trouble; and as that was employed on land of little value, this is intended for ſuch as is of no value at all.

When we name wet and marſhy places for the raiſing of this plant, we are not to be underſtood as meaning bogs. There are plants peculiar to bogs, utterly diſtinct from the common water plants, and unlike them; as the wet in which they grow is unlike common water. By water plants we underſtand thoſe which grow about the edges of rivers and ponds: and bur-reed is one of theſe. It will readily grow on ſuch wet ſoils in other places; but not on bogs: for though it requires a great deal of water, it muſt be in the natural ſtate; not ſuch as is ſeen in the wet parts of abſolute boggy land.

The plant has been known in the earlieſt time; and from thence to the preſent it has been known cattle eat it greedily, but no advantage has been made of the obſervation. Theophraſtus, who calls it *Butomus*, a name we have of late attributed to another of the water plants, ſays, oxen fed on it; and in the Iſle of Ely, where it is moſt common of all, though every where frequent enough, the farmers obſerve, that their cows and oxen frequently get into muddy ditches, where they are in danger of being loſt for the ſake of feeding on this plant which grows in them. They have, in ſome places, been at the pains to deſtroy whole banks of it, by tearing them up and burning them, not recollecting that the fondneſs of theſe cattle for the herb, and their plainly feeding on it without hurt, was an indication that it would be worth their cultivating in places where it could be got at without this danger; and where the ground was good for nothing elſe. Linnæus, in his account of the Lapland plants, makes the like obſervation on the delight oxen takes in feeding on this; and others, in various places, have made the ſame remark. What I have endeavoured to find farther is, the effect it takes upon them. This I have enquired by letters, to various perſons who are curious in theſe reſearches; and though a full credit could not be given in ſuch a caſe to any one teſtimony, becauſe error is ſo eaſy, yet, when ſeveral confirm a fact, we may reaſonably ſuppoſe it true; at leaſt, if the accounts are favourable, we are juſtified in recommending the thing to more trial.

All the information I have received concerning this plant, declares it to be innocent, and ſome go much farther, declaring it highly uſeful.

Upon a fair obſervation made for many months, on cattle put to feed in paſtures where there was, and others where there was not this plant, it appears that thoſe fattened ſooner where there was plenty of it, than ſuch as fed on paſtures where there was little or none. On examining the dung, which I deſired might be particularly obſerved, ſuſpecting the plant might incline them to a purging; nothing of this appeared in any inſtance wherein I have received information.

The effect on milch cows is the encreaſing the quantity of their milk; whether or not it debaſed it in quality, I am not able exactly to determine. If it have that effect, it cannot be in any great degree. The generality of thoſe, from whom I receive accounts, mention the encreaſe of quantity without any hint of the quality being altered; but from two correſpondents in different parts of Yorkſhire, I received ſuſpicions, that the advantage in quantity was loſt in the different nature of the milk. Theſe correſpondents ſay, that it gives no peculiar flavour to the milk, but that it is thinner, and ſomewhat bluer in colour; and that the cream, though good, was not in the ſame proportion.

Thus ſtands the preſent teſtimony, which future obſervations will either confirm or refute; but as it ſtands, there is all imaginable reaſon for making the experiment, and there will be no expence, nor can any thing be more eaſy.

CHAP. LXXI.

Deſcription of the plant.

THE bur reed is a plant of two foot and a half high when in flower, but the far greater part of the year the leaves only are ſeen, and theſe are the beſt nouriſhment. The root is compoſed of many long ſtrings joined to a ſmall head. The leaves riſe in cluſters from theſe, and they are long and fleſhy; they reſemble flag leaves at firſt ſight, but when better examined, they are found to be not flat, but almoſt triangular. They are of a fine, freſh green colour, and very juicy.

The ſtalk is round and thick, ſometimes it riſes ſingle, and ſometimes it is branched: there are leaves on it, principally toward the bottom, and they are like thoſe from the root. The flowers ſtand in round knots toward the top, and they are ſmall and white, the ſeeds follow on lower parts of the ſtalk, and are collected alſo into round cluſters,

ters, like burrs upon the common burdock, or like the fruit of the plane tree. Theſe ripen and may be ſown: but the ready way of propagating the plant is by the root. Whereever there is damp ground it will grow; but the great advantage of it will be to the farmer, who has a brook running through his grounds; or any other quantity of water.

The ſides of rivers are always covered with a kind of water weeds, and theſe are generally uſeleſs, and many kinds of them dangerous; for the moſt poiſonous of the Engliſh plants are natives of our river ſides. In the place of theſe he will have an opportunity, with very little trouble and without expence, to plant an herb that will be, in the higheſt degree, agreeable to his cattle, and will anſwer his purpoſe excellently in feeding them; and perhaps, yet more beneficially ſerve him in regard to his cows, by increaſing their quantity of milk.

There will be this farther advantage in raiſing the plant, that it will keep the ſhore clear of ſeveral kinds which are apt to encroach upon the land. The water weeds of ſome ſpecies are of the ſame quality with the hedge ſhrubs of paſtures, they will run at the root, and encroach upon the banks. Thus the water docks and many other kinds which no creature eats, when they have got footing upon the bank, run into the ground, and the farmer loſes ſo much land for all uſeful purpoſes, the whole way. This may be prevented by planting this particular herb; for it will occupy the place entirely, giving no room for any other; and it will not run into the ground, unleſs, where that happens to be ſo watery, that it will bear nothing elſe: in which caſe, the roots will extend themſelves to the great advantage of the farmer, and not at all in any other.

The huſbandman who has paſture ground, through which a ſmall river runs, or who has obſerved the ſame kind of land in another's poſſeſſion, if he have looked with a careful eye, muſt have ſeen, that what may be called the bank loſes ſomething; and that the weeds from it propagate themſelves into the water, ſo as to make it a much more conſiderable extent. I have ſeen, where a brook has been but five yards wide, a yard and half of the ſurface of the water on each ſide covered with weeds, which had rooted themſelves in the land, and ſent off runners in the place of roots, which floating on the water, get abundant nouriſhment, and make an abſolute and continued coat over the ſurface. Since this is the courſe of nature, and ſhe will have it ſo, the queſtion is eaſily anſwered, whether theſe weeds ſhall be poiſonous, uſeleſs, or wholeſome. This is in the farmer's power, and let him uſe that opportunity rightly. All water plants are full of life, and none more than this: therefore, wherever it is planted in the neighbourhood of water, it will grow.

CHAP. LXXII.

Of the manner of planting it.

AS I conceive the farmer will reap great advantage from this herb, and the utmoſt trouble he can employ upon it is but little, I would not have him omit that. The following method will be the beſt for planting it. Let him clear away all the weeds which grow along the banks of the brook or river, and all that run into the water itſelf from the ſides. Let him diſtinguiſh thoſe which run in from the ſides, from ſuch as abſolutely riſe from the natural bottom. There are many of theſe, the pond weeds and the like, and it is unneedful to diſplace them, becauſe nothing will grow in their place; but what we mean here, are thoſe kinds, which, though their roots are in the mud, are, in every other part, out of the water; and which have originally been ſent into the water, by creeping roots and ſtalks from the bank. The ſame mud which ſupported theſe will as well nouriſh the uſeful herb here propoſed, and being cleared of theſe, it will readily receive it. Let the face of the bank be alſo cleared, for it muſt be planted there; and let not the farmer grudge this trouble, for he will have no more. Indeed, if he be a good manager, this labour will pay itſelf, independently of the expected benefit. The weeds are not to be thrown away; they will make a very uſeful addition to the dunghill.

When the bank is cleared, let a parcel of the bur-reed be drawn up from ſome neighbouring water in the month of Auguſt, and then let the farmer part the roots, trim off the fibres as gardeners do, and opening holes in the bank on each ſide at a yard diſtance, and juſt upon the level of the water: let one good root be planted in each of theſe holes: nature will do all the reſt. The plants will be ſtrong before winter; and the next ſpring the whole verge of the water on each ſide will be covered with a green bed of this herb.

In July they will ſhoot up for flowering, but this ſhould, by all means, be prevented, for it exhauſts the roots, and prevents the growth of leaves. No more is required than to ſend a man with a ſcythe along the banks, or into the water, with orders to cut off all the riſing ſtalks.

Once again, at the diſtance of about three weeks, it will be proper to do this, but it will not be neceſſary after that any more; for the ſhooting ſeaſon will be over for flowers, and the whole force of nature will be ſpent in forming off-ſets from the roots, and ſending up ſhoots of cluſters of leaves from them.

What may be done thus, by a very little art, I have ſeen plainly enough proved by what happens in nature. Near Denham in Buckinghamſhire, there is about a quarter of a mile of one of the banks of one of the ſhallow trout rivers, occupied by this valuable plant. It has, every where, run three, four, or five feet into the water; and wherever there is a hole burrowed into the land by any ſudden turn of the ſtream, this alſo is covered with it. Where any little ditch or drain opens into the river, the water juſt has its current, and all the reſt of the ſpace is occupied by bur reed. The quantity is vaſt: it has no where encroached upon any uſeful part of the ground; but compleatly occupies, all that is too wet, for better produce, taking the place of ruſhes and thoſe other ſour weeds, too common about waters. The cattle are extreamly fond of it; and the more it is crop'd, the faſter it grows. I have enquired among thoſe, to whom the cattle belonged, which fed on this particular ſpot, what were the effects: but theſe kind of people leſs attend to their own buſineſs than any others. All I learned was, that theſe paſtures were eſteemed better than the others about them; but as to the plant, which was palpably the occaſion of that ſuperiority, they plainly knew nothing of it: not ſo much as that any ſuch thing was there.

Where the water is of this kind, clear and ſwift in current, and the adjoining ground rich, this plant flouriſhes beſt of all. Theſe waters are generally ſhallow; and the cattle walk in up to the mid leg, and ſtand in them feeding: an epicure would envy them the repaſt. His wine in ice does not equal the coolneſs of the freſh ſtream, nor all his delicacies the full flavour of that ſingle herb to their undebauched appetites. This may be ſeen in their aſpect, and the conſequence is their growing fleſhy; and for the ſame cauſe, better health and more nouriſhment, the cows alſo fill the dairy.

In ſome other pieces of ground near the edges of the ſame rivers I have obſerved this plant grow all along the ſides of the little drains they cut to let off the water after flooding; and the conſequence has been the ſame as in the other inſtances: the large cattle, fed upon ſuch ground, have always eat this down before they touched any thing elſe upon the place; and they throve very well ſo long as there was any quantity of it, and no longer; for the general growth upon ground, that wants this kind of draining, is not favourable to theſe large and nice creatures.

From this obſervation, which, however limited in its nature, is accurately true, we may be led to ſomething more of extream uſe in many parts of the kingdom.

CHAP. LXXIII.

Of planting bur reed on boggy ground.

I Have obſerved that the bur reed is no where more plentiful than in the Iſle of Ely, and the other fen countries. It may be there made of great uſe, though at preſent it is not; and by the ſame rule in other places, which are of a like character and quality. We have large ſpots of ground in many parts of the kingdom, which are called moors; and which are of the nature of the fen land: that is, they lie juſt above the level of the rivers, which run by them in their common ſtate, but conſiderably lower than the waters riſe in floods. They are therefore often overflowed, and always wet; they are of little value for any of the farmers purpoſes; for the graſs is poor and ſour, and it is only a part of the year they can be of any uſe, or are paſſable.

There always are hollows and a kind of ditches in various parts of theſe grounds, which detain the water longeſt, and which indeed are ſcarce ever truly dry. Theſe are, in ſome degree, of the nature of thoſe artificial drains before mentioned, only much more extenſive. The ſoil is a looſe, rich, black earth, ſuch as the bur reed loves; and there is generally moiſture enough for its favourable growth.

The ditch ſides, in theſe kind of grounds, uſually abound with the bur reed, but there it is dangerous for the cattle to meddle with it; for theſe ditches, which ſerve in the place of hedges in thoſe countries, ſeparating and encloſing the ſeveral portions of land, are dug deep, and have muddy bottoms; ſo that an ox is in danger of being loſt, if he happens to fall into one of them. It would be adviſeable therefore to drag up this herb from the ſides of thoſe waters, and plant the roots in thoſe low places of the ground itſelf, which have been juſt mentioned. Here it will ſoon take root, and cover the ſpot with a moſt uſeful growth. The method of planting ſhould be the ſame as directed for the banks of brooks, and nothing will grow more readily. The plants ſhould be ſet in Auguſt or September, and about two foot and half diſtance, every way will anſwer very well. Theſe will join one another in a very little time, and there will be one continued bed of this uſeful herb.

This will be the more advantageous in ſuch places, becauſe the graſs is in very ſmall quantity; and though it fade a little in long droughts, it will recover after the firſt rains; and every overflowing of the ground will be as a kind of proper culture given it purpoſely.

The vaſt quantity of ground that lies waſte in England, is one of the great reproaches of our government, and the loſs to the ſtate is vaſt from this ſingle article. This waſte land is of two general kinds, heath and bog. For the improvement of the firſt ſpecies we have given many rules, and there has been of late ſo much done in the reducing ſuch ground to a ſtate of culture, that the kingdom ſeems in a great way of encreaſe from it.

The other, or boggy land, is of a different quality, and requires a management altogether different. The draining it is the firſt natural attempt, and the moſt rational; but this is beſt ſuited to ſuch places as have very great quantities of it. There are ſpots too ſmall for ſuch undertakings; and peculiar places among better land, which neither will admit that improvement, nor are worth the trouble of it. The proper management of theſe is, by finding uſeful plants that will grow upon them; and, in many caſes, when the ground, though of a larger extent, will not admit of draining, the ſame courſe may be uſeful. The improvements upon this head depend on one principle, and that an extreamly plain one: he will ſucceed beſt who knows what is the moſt uſeful plant that every kind of ground is able to ſupport; and this is what I have laboured to inculcate here.

CHAP. LXXIV.

Of buck bean.

WE ſhall purſue the ſubject of the preceding chapters, the planting of wet ground, through the preſent, and the two or three ſucceeding; and we have a plant to recommend, of which the farmer probably has not heard before, or if at all, very imperfectly. Its uſe is leſs known than its form, but it is ſuch as is very worthy attention.

Every one knows the value and the expence of hops; and thoſe, who have at all attended to the expence of raiſing them, the labour of gathering and curing, and the many accidents to which they are liable, will not wonder at the large price for which they ſell at market. It appears, from the moſt certain of all proofs, experience, that the leaves of this plant buck bean, are of the ſame quality: they may be raiſed with very little trouble, on ground which is of as little value; and the quantity they produce is very great.

Many attempts have been made to ſave the hop, but all, except this, unſuceſsfully. Wormwood has been uſed, but this is extreamly nauſeous: we want a bitter, but it muſt be a clean and pleaſant bitter. Wormwood, on the contrary, has, beſide its bitterneſs, an inſupportable nauſeous flavour. The leaves of buck bean are as bitter as the hop; and if they want the peculiar flavour of that fruit, they have nothing diſguſtful in the place of it. They have bitterneſs to recommend them, and nothing more: nor have they any thing againſt them. As to their qualities they are very wholeſome, and if beer can be made pleaſant to the palate, and capable of keeping with them as with the hop, they will be a great advantage to the farmer, who has ground fit for them, and which lies at preſent uſeleſs.

Whether the leaves of this plant are capable of anſwering the purpoſe of hops fully and perfectly, I cannot ſay with certainty; becauſe the experiments I have known have been made with the herb, either freſh, which is very wrong, or ill cured, which is little better: but in theſe they have ſucceeded ſo well, as to make it very rational to believe, that under proper management, they may anſwer perfectly. I have taſted beer brewed with them by the poor, which has been at leaſt as good as any which thoſe people ever made with hops; and I have occaſionally drank ſome of a better kind, brewed with the ſame ingredient, by thoſe who did it for the virtues of the plant: and this has been much ſuperior to the firſt; but not equal to the brewings of the ſame family with hops.

It is plain, from theſe examples, that the leaves of this herb may imperfectly ſerve in the place of hops; and this would be ſomething, would the matter go no farther; for they might ſave the expence of that article in the farmer's brewings for his own family. But it yet remains to try what would be the abſolute effect, if theſe leaves, which, in all thoſe caſes, have been gathered with little ſkill, and uſed with leſs, had the fair trial of a proper gathering and good curing. From what is ſeen, the farmer may be certain it will be worth his while to propagate the plant upon ſuch ground: and we ſhall direct him in the management of the leaves, in ſuch a manner, as may perhaps ſet them in a much higher light.

CHAP. LXXV.

Deſcription of the plant.

THE root of buckbean is very large, irregular in ſhape, and ſpungy in its ſubſtance; it is long, and conſiderably thick, and it does not pierce down perpendicularly into the earth, but runs ſlanting under the ſurface, ſending up ſhoots of leaves from various parts, and by that means ſpreading and multiplying itſelf greatly.

The leaves are placed there on each foot-ſtalk, as in clover, and the other trefoils, but they are vaſtly larger than in thoſe plants, they are of an oval form, and of the bigneſs of a bay leaf: many of the ſtalks riſe together, ſo that the quantity of leaves, upon a ſingle plant, is often very conſiderable.

The ſtalk for flowering is about ten inches high; and the flowers, when they are ſuffered to ripen, are very pretty. They are moderately large, their colour is white with a bluſh of red, and they are hairy: the ſeed veſſels which follow are oval, and contain many ſeeds.

The leaves are the uſeful part, therefore they ſhould, by all means, be encouraged, and conſequently the flowering ſtalks ſhould be cut off before they open into bloom. This is eaſily done, for the flowering ſeaſon comes on regularly toward the end of July; and if they be cut off at that time, they will not ſhoot again for flower that year. A man with a ſcythe will be able to cut them down in a few hours throughout a whole field of the plant. There is not the leaſt occaſion for ſparing any part of the flower, for the ſeeds are never wanted, the root multiplies ſo abundantly.

The plant is common in wet ground in moſt parts of the kingdom; and may be propagated ſucceſsfully any where, where there is moiſture. We obſerved, in ſpeaking of bur-reed, that it would only grow where the water is clear and good; but this plant is leſs nice in its nouriſhment. I have ſeen it in the fens about the peat-ground; and have obſerved it flouriſh very well in places ſo nearly of the nature of bogs, that it is probable it may be raiſed in abſolute bogs, which cannot conveniently be improved by draining.

CHAP. LXXVI.

The manner of planting it.

LET the farmer chuſe a piece of ground that is wet in itſelf, or ſubject to be ſo often overflowed, that it produces only ruſhes, ruſh-graſs, or ſuch other uſeleſs matters; and let him dig away any great clumps of ruſh or flag that happen to grow in it: as to the reſt of the produce he may leave it. The buckbean flouriſhes beſt, when its root runs under a covered ſurface.

To plant this regularly, let a line be drawn as gardeners uſe, firſt two foot from the edge that is toward the water, and let ſmall ſticks be ſet up at eighteen inches diſtance, all along this line, as marks where the plants are to be let in; then let the line be removed, and ſtretched again parallel to the firſt, at two foot diſtance, and let another row of ſticks be ſtuck into the ground a foot and half aſunder, but not oppoſite to the other, but to the middle of the ſpaces between them. In this manner let lines be drawn over the whole ground, and ſticks ſtuck in to mark the places of all the plants.

In the beginning of September, let a parcel of the plant be taken up, ſufficient for the new ground, and the roots regularly let in.

Every root muſt have a good head or eye, and ſhould be of about two inches length. The beſt inſtrument for planting is a ſharp trowel: with this let the turff be cut through in form of a croſs where the plant is to ſtand, and then lifted up. Let the fibres of the roots be trimmed off, and let it be planted with the eye upwards, an inch or thereabout beneath the ſurface, and the turff let down upon it.

This is very quickly done, and no more is neceſſary; the ground is naturally moiſt, and a wet ſeaſon will follow. The roots will ſucceed ſo well, that a firſt gathering of the leaves may be made early in the following ſummer; and from that time the plants will increaſe, till the whole ground is covered with them.

If there be any large weeds among them, the firſt year they ſhould be pulled up. Water docks and the marſh thiſtle are moſt likely to be troubleſome; and theſe ſhould be deſtroyed in May, before they have time to ſeed, becauſe they then lay the foundation for a laſting progeny. After this, the plants will ſoon occupy the ground ſo thoroughly, that no weeds can find place among them. The flowering ſtems, we have obſerved, muſt be cut off, when they firſt appear, and by this means the quantity of leaf will be greatly increaſed.

The farmer, who ſees a piece of ground thus covered with the plant, will perceive that one crop of the leaves muſt amount to a conſiderable quantity; but he will have many ſuch in a year. How many exactly it is not poſſible to ſay; but by what I have ſeen in my own trials, I believe he may reaſonably expect ſix.

By the ſide of the DENHAM river, about a quarter of a mile above the place where it runs into the gardens of the late SIR ROGER HILL, there is a long cloſe ſurrounded with water, and from its low ſituation always wet. It is alſo ſubject to very frequent overflowings, for being naturally but a few inches above the level of the water, whenever the mill that is upon the river in thoſe gardens is ſhut, the water riſing above its level, floats it entirely. In this cloſe there is a vaſt quantity of buckbean; and I made laſt year ſeveral experiments upon one particular ſpot of it.

The principal were with regard to the root, which I find will grow from very ſmall pieces; and to the quantities the plant may be brought to produce.

I took off the leaves from all the plants in a certain ſpot of this ground, as ſoon as they were of their full growth, and taking the caution to cut off the flowering ſtems when they appeared; and to gather every parcel of leaves as ſoon as they were full grown, I took from the ſame plants ſeven quantities of them. It is upon this account I have ventured to gueſs at the number of crops. The plant grows in that place among other weeds, as they are called, and with little care or regularity; and probably under a better management, more might be obtained from it; but this is no trifling account, eſpecially as the leaves are large.

CHAP. LXXVII.

Of curing the leaves.

THE taſte of the leaves of theſe ſeveral gatherings was equal, except that in one crop I had left them too long upon the plant, they had grown brown on the edges, and were leſs freſh than the others; and they had leſs bitterneſs.

This may ſerve as a caution not to neglect the time of cutting them, when they ſhall be raiſed for uſe; for their period of perfection plainly is, as ſoon as they are fully open; and after that they loſe rather than gain any thing for ſome days; and when they begin to loſe their freſh green colour, they grow worſe.

The leaves I gathered were dried afterwards upon a line ſtretched acroſs a barn: but this is not to be practiſed for quantities. Bitter is a quality that is not to be loſt in any common management, for it will not riſe in diſtillation, nor be obtained any way by evaporation; therefore neither can it be loſt by evaporation: ſo the farmer need not fear this accident. The leaves ſhould be cut with a common ſcythe, and then carried off the ground to be made as hay. They will require no more care or management than common graſs, only the ground whereon they grow being damp, they will not dry upon it, nor can the people tread about, in making it, conveniently to themſelves, or without doing a great deal of damage. This cutting takes off alſo the ſhoots of ſtalks, intended for flowering, and unleſs the gathering happen at odd times, there will be no need of any farther care on that head. If thoſe ſtalks ſhould be getting to a height, while the leaves are but growing ready, the tops muſt be taken off by a few ſtrokes of the ſcythe, as we have directed.

The leaves being carried to a dry piece of ground, are to be ſpread and turned often; for the quicker they dry, the greener they will be; and the finer is their colour, the better always is their taſte. When they are thoroughly dry, they ſhould be picked off the ſtalks; for it is the leaves themſelves that poſſeſs the virtue fully: the ſtalk is ſpungy,

wateriſh,

wateriſh, and has much leſs of the bitter: it approaches toward the nature of the root, which is ſo far from bitterneſs, that it is like flour or meal when dried and ground to powder; inſomuch that Linnæus tells us, the people of the northern provinces have, in ſcarcities of corn, uſed it inſtead of flour for bread.

The leaves are to be the Engliſh farmer's conſideration, and they ſhould be ſeparated from the ſtalks, as ſoon as they are thoroughly dry, not only becauſe the ſtalk has no value, but becauſe they will be eaſier to pack up without it; and its ſpungy ſubſtance being apt to attract moiſture, the leaves will be in danger of getting damp, and of decaying if it be left on. As to the addition it would make to the quantity, that is no conſideration at all; for it would reduce the value in proportion: ſo that on all accounts the method of picking off the leaves will be beſt. Women or children may do this, and the charge will be very little. After the leaves are thus ſeparated from the ſtalks, they ſhould lie one day more to air again; and they may, after this, be packed up in parcels, and put in barrels, treading them down, or any other way kept cloſe, and fit for uſe or ſale. They will keep good three or four years; or if no accident happen to them through damps or otherwiſe, longer. But they are beſt the firſt year.

CHAP. LXXVIII.

Of the management of the ground.

THE quantity of moiſture that agrees with this plant is very conſiderable; but it may happen that there may be too much. Though the ground ſhould be moiſt, it ſhould not be overflowed; therefore drains muſt be made with a ſluice at the bottom, which will enable the farmer to keep in as much water as will be uſeful, and yet to prevent what would be deſtructive. The drains need be little more than thoſe ſingle ſpade deep trenches they cut, for getting the water out of meadows; and the plaineſt and ſimpleſt ſluice that can be made will anſwer the purpoſe.

With theſe eaſy cautions the ground will keep in very good order, ſix years or thereabouts; but after this, the roots will be matted together, and choaking one another, the produce will be leſs. They will require parting according to the gardeners faſhion; and once again the labour of the planting the field muſt be repeated. This will be as cheap and eaſy as the firſt, and will give it as good a condition for ſix more years.

The beſt ſeaſon for taking up the roots is September; and it need not be done with any great care: the only fault in the field is, that they are too abundant. They muſt be taken out, and cut into ſmaller pieces, and theſe planted again as at firſt. The reſt, if not wanted for a new plantation, ſhould be added to the dunghill; for it is a root that eaſily rots, and makes a very good addition to manures; and there is no danger of its growing on the lands where this dung is to be uſed; not only becauſe it will ſo ſoon rot in the mixture, but its natural place of growth being by waters, if by any chance a piece ſhould keep the remains of life, it cannot grow for want of that eſſential article in its production.

That the leaves will anſwer the purpoſe of hops is certain; and I think that when cured in this careful manner, and uſed by an experienced brewer, they would at leaſt equal the hop; and perhaps might prevent ſome of thoſe many accidents which happen to beer in the keeping, and which, tho' they are attributed to very different cauſes, are many of them owing really to that ingredient. With regard to its medicinal virtues, they are thoſe of all bitters, ſtrengthening the ſtomach, and aſſiſting digeſtion. It is alſo in ſome degree diuretick, clearing the urinary paſſages, when taken alone, in a ſtrong infuſion. All this muſt help to recommend it the more, for it will render the malt liquor, in which it is uſed, alſo in ſome degree ſtomachick and diuretick, and will be a great preventer of the gravel and ſtone. It may not be foreign to the intent of this work, to add on the preſent occaſion, that malt liquor is the only rational drink of people ſubject to thoſe terrible diſorders. This was proved by a very ſurprizing inſtance in the obſervations of Dr. Cyprianus; who, of many hundred he cut for the ſtone, declares, there was not one abſolute beer drinker among them.

CHAP. LXXIX.

Of the buckthorn ſhrub.

FROM the plantation of meadow ground, we advance to that of hedges, in which there is one ſhrub that occaſionally ſhewing itſelf, convinces the farmer it will grow very well, and very freely in them; and which though neglected hitherto, will, if we can bring it into uſe, be a very

great

great addition to his gains. This is the common BUCKTHORN; a ſtrong, hardy, prickly ſhrub; native of England, and ready to grow wherever the common hawthorn will.

In the common advantages of a hedge, it is ſecond to none except the hawthorn, which indeed exceeds all in that ſingle uſe, and would be preferable to all others, if no good could be expected from a hedge but as a fence. But there may be a great deal more benefit from hedges not only expected, but eaſily obtained. In firmneſs of wood, this is equal to the hawthorn, and the thorns are as formidable; they do not riſe as in the bramble, from the bark only, but as thoſe of the hawthorn, from the wood. The ſhrub itſelf is of a taller growth than even the hawthorn; and if pleaſing the eye be an article of any conſequence, its leaves are of a handſomer ſhape, and brighter colour. The circumſtance in which it is inferior to the hawthorn, is, that the branches are not ſo numerous; ſo that it naturally does not form ſo thick a hedge. Far be it from us to lead the farmer into errors: he muſt not depend upon it alone; but if he will raiſe a hedge with alternate plants of the common hawthorn and the buckthorn, it will anſwer all his purpoſes as a fence, as well as if it were of the hawthorn alone; and there will be a very great advantage in the ſhrub we recommend beſide.

If it were only for the uſe apothecaries make of the berries, the advantage would be ſomething; for ſyrup of buckthorn is a medicine in very general uſe: but beſide this, the colour called by painters ſap green, is made from them; and on both theſe accounts they bring a conſiderable price: but the article for which we particularly recommend the ſhrub, is of another kind. The bark is a very ſtrong and laſting yellow colour for dying. This is not only uſeful ſimply in itſelf, but in the management of other colours, and may be an article worthy, in a particular manner, of the attention of that excellent ſociety now eſtabliſhed for the improvement of arts and commerce. It is the province of the naturaliſt to examine what may be uſeful; and of the farmer, to make the tryal; but it is theirs to honour and reward thoſe who ſhall ſucceed. Genius is uſually poor, and many valuable improvements die in the hands of their inventors, or enrich other countries which pay their writings that attention their own deny.

In a period when the ſpirit of enquiry is at its height, and the general neglect of what is uſeful is in no lower a condition, ſuch a ſociety ſeems to have been inſpired by that providence which has the care of ſtates, and which, for the merit of a few, perhaps regards this.

That an uſeful addition may be made to the articles employed in dying, by introducing the buckthorn, is not only reaſonable to think, from what we ſee, in chewing the bark of that ſhrub, or in the other eaſy ways of trial, which fall within the reach of private hands; but from the experience of other kingdoms. It has always been uſed in ſome parts of Germany, among other ingredients for that purpoſe; and Linnæus, in his journey into the northern provinces of Sweden, found it in common uſe there for the purpoſe of dying.

The colour that it gives is a ſtrong and bright yellow; and there is with it a glow of purple, which may be increaſed or diminiſhed, according to the management of the bark, and to the other ingredients which may be added to it. There is ſomething ſingular in the colour, which it yields moſt freely; and it is as beautiful as it is peculiar: one would not imagine that it was the effect of any one ingredient. That the farmer may not fear having ſome advantage from planting this ſhrub in his hedges, we have named before the price its berries will obtain; and have directed the planting it in ſuch a manner, that his hedge will be as good a fence, as if it were of hawthorn entire: and for his farther encouragement with regard to the colour that may be made from the bark, I ſhall add this proof, that a colour for painting may be made of it. I have extracted ſuch a one from this bark; and I do not yet know, that any vegetable ſubſtance will yield this body of colour, which does not alſo afford, with a much eaſier management, a liquor for the ſervice of the dyer.

CHAP. LXXX.

A colour prepared from this bark.

IN June 1756, I pulled from the wood a quantity of freſh and fine buckthorn bark, from the middles of the branches; its weight was ſome ounces above three pounds. I cut it to pieces, bruiſed it in a marble mortar, and worked in with it, by degrees, two quarts and a pint of common water, beating and grinding the bark freſh with every addition of the water, till the whole was very ſtrong with it.

I ſet

I ſet this by ſix hours, then poured to it an ounce of oil of tartar per deliquium, and putting the whole into a large earthern pipkin, I ſet it over a gentle fire to heat, and after an hour and half let it boil; ſtirring it from time to time with an ivory knife.

When it had boiled gently a quarter of an hour, I preſſed the liquor gently from the bark, and filtered it through a coarſe paper, it afforded a moſt ſtrong and clear yellow colour.

While the liquor was filtering, I diſſolved ſome common alum in a little fair water, and when the whole was done, poured the yellow liquor into a baſon, and gradually put to it ſome of the ſolution of allum. By degrees, the liquor curdled, the yellow matter got together, and after a little time, I put this alſo into a funnel, lined with the ſame coarſe paper, to filter.

When all the liquor was come off, there remained a fine ſtrong yellow matter: to this I put freſh water, without taking it out of the filter, and when this liquor had run thro' I put in more water, till there was no taſte of alum in the clear liquor that came through the filter. There now remained, in the paper within the funnel, an exceeding fine yellow pulpy ſubſtance. I laid the paper, with this upon it, on a chalk ſtone, which preſently ſucked up the greater part of the moiſture; and then taking it off from the paper with the ivory knife, I laid it on another, and laying that on the chalk ſtone, left it to be perfectly dried.

Thus I obtained a fine paint, the ſame thing in yellow, that carmine is in red; which I have uſed in the colouring ſome figures of plants, and which has ſtood to this time unaltered, and has been particularly admired by all who have looked upon the figures.

This is all I have had opportunities of doing by way of proof, of the uſe of the bark of buckthorn in dying; but I think there is no room to doubt that it will anſwer that purpoſe, ſince the colour I obtained in a ſolid form, was no other than what had before been in the liquor; and any dying liquor, made from a vegetable ſubſtance, will, by the ſame procedure, which is well known to the lake makers, afford its colour in the ſame form. Logwood, which makes a fine red liquor for dying, affords, in the ſame manner, a fine bodied colour; and ſo do the generality of others. Dr. Shaw, who has delivered the general method of making the lake colours, in very expreſſive accurate terms, hints, that the production of many new paints and dyes may be diſcovered by ſuch experiments; and this bark, ſo eaſily obtained in any quantity, promiſes very fairly to be one. It would coſt the farmer very little to try: one of the premiums of the ſociety before named, would be a ſufficient inducement to him to make the experiment.

CHAP. LXXXI.

Of the black alder.

THERE is a ſecond ſhrub of the nature, in ſome degree, of the buckthorn, which ſhould not be omitted when we have mentioned the laſt; though it is inferior in its qualities, and more limited in its uſe: this is the black alder. Its bark, in the ſame manner as that of the buckthorn, gives a yellow colour, and may deſerve trial: it is a paler yellow than the other; and has nothing of the purpliſh hue of that, but it is not leſs elegant. The berries of this ſhrub alſo contain a green colour, which will anſwer very well in the colouring woollen cloths.

The diſadvantage that attends this is, that it is a weak and ill-growing ſhrub, eaſily broke, even ſo as to have obtained its common Latin name thence, FRANGULA; and that it is deſtitute of thorns. It cannot therefore anſwer as a hedge ſhrub, nor be brought into univerſal uſe ſo eaſily: but ſince it certainly contains theſe uſeful principles, it will be very well worth while to raiſe it in thoſe places, where there are ſoils that give the opportunity; eſpecially as thoſe grounds are good for little elſe.

If the farmer have a piece of boggy or wet ground about the ſkirt of a coppice, he can plant nothing that will grow better in it than this ſhrub. We ſee an inſtance of this near London, on Hampſtead-heath, where the ſhrub flouriſhes in a hedge, where the water of the principal bog diſcharges itſelf; and where enough of the bark may be, at any time, procured for a trial.

There is alſo another reaſon why it would be worth while to raiſe it in particular places; for the ſtriped branches have their uſe. They burn to a kind of charcoal which is very uſeful in gunpowder: and conſequently, if the farmer, who ſhall raiſe it, live in the neighbourhood of a powder-mill, his produce will be of ſo much the more value. Theſe conſiderations ſhould always be kept in mind, and what we propoſe to the huſbandman, ſhould claim alſo, in a peculiar manner, the regard of country gentlemen. They can beſt run the little riſque there is in trials of things propoſed for publick utility, and a patriot ſpirit could never exert itſelf more honourably. The raiſing a few of theſe ſhrubs would be no expence, and ſuch perſons have influence, by means of their connections and dependants, to bring theſe things to a trial. The expence at which this nation imports many of the ingredients uſed in dying, is a very conſiderable thing, and there is reaſon to believe a great part of it may be ſaved by making a proper uſe of the produce of our own country.

C H A P. LXXXII.

Of water hoarhound.

UNDER the conſideration of colours for the uſe of dying, which may be obtained from the products of our own kingdom, it would be wrong to overlook the antient black, which our anceſtors obtained from WATER HOARHOUND, a weed ſo abundant on the ſides of ditches, that we need not recommend its culture, only the gathering of it where nature offers it. The uſe of galls has ſuperſeded that of this plant, becauſe they are more eaſily managed; but it is not always that the moſt convenient ingredients are the beſt. We have taught the Chineſe the art of colouring their ware with powder blue, which they did before with an ingredient of a ſuperior nature, made by themſelves. But the China ware is the worſe for it; and they have reaſon, who prefer the old blue ſo vaſtly.

Perhaps ſomething of this nature may have happened with regard to this plant. The black, which we dye in England, is not nearly equal to that of France. Thoſe who have the ſecret there, are wiſe enough to preſerve it; but it would be no unnatural thought to ſuppoſe they may uſe ingredients we do not. Whether this be at all the caſe, is impoſſible to ſay; much leſs whether this herb be one; yet there are circumſtances that point out ſomething like it.

Many years ſince I ſaw, in the weſt of England, coarſe woollen ſtockings, which the farmers wives had made from the ſheerings of their own flock, and died with this herb and copperas. I remember that the deepneſs of the colour appeared particular to me at that time, and was indeed the reaſon of my enquiring with what it had been done. In France alſo, it is certain, this herb is gathered for ſome purpoſes in many parts of the kingdom, and is ſold dry as well as green. I am not aware of any other uſe of it, for it is unknown in medicine. If we put theſe circumſtances together, may there not appear a probability that the French uſe this plant in their black dye? Probably it would not anſwer well, or not conveniently alone; but it is worth a trial, if our dyers could be brought to make it, whether this plant may not be employed to advantage, particularly in the dying of the fine black cloths, either alone or with galls; and in what proportion.

If it ſhould be found of uſe in this reſpect, the quantity of it which nature offers on the banks of our ditches, is very great; but we need not be limited to this alone, for nothing can be more eaſy, than to propagate it in abundance: the root is perennial and ſpreading, and the place of growth is land of no other value. The ſides of ditches always waſte ſome ground, and theſe are the natural place of the plant: it is abundant throughout the neighbourhood of London; and indeed, ſo far as I have ſeen, through the whole kingdom. The farmer who has a mind to ſee it growing, may find abundance of it on the ditch-bank going to Ranelagh, a little on the ſide of the bridge that goes over the Chelſea water-works. It might be planted as we have directed, for buckbean; and every piece of the root would grow: the banks would ſoon be covered.

CHAP. LXXXIII.

Of devil's bit.

THERE is a kind of ſcabious common in our meadow and paſture grounds, the flowers of which are of a fine deep blue, and of a globular ſhape; they ripen in the beginning of July. The leaves of this plant contain ſo ſtrong a juice, that it is uſed in many places in dying, and might perhaps be alſo uſeful here. The root appears bitten off towards the bottom, for which reaſon it is called devil's bit; a name given alſo, for the ſame reaſon, to a kind of hawkweed, and ſome other plants, whoſe virtues (according to the fables of thoſe times) the devil was ſuppoſed to have envied to mankind: but this will eaſily be known from all the others, by the freſh and ſtrong green colour of its leaves, and the beautiful blue of its flowers.

The juice the leaves contain is of the nature of that of the leaves of woad well known in the dying trade, only that it is of a pure and perfect green. The Swedes, who uſe it for dying woollen goods, call it by a name expreſſing a kind of WOAD.

The plant is ſo common in our paſtures, and there is ſo much appearance of its anſwering to the character given of it by thoſe who have uſed it in the northern nations, that certainly it will be worth gathering and trying. The management of the leaves ſhould be the ſame with that of the leaves of woad, which we have directed at large in a preceding part of this work, and need not repeat here; and as it would coſt only gathering for a trial, we cannot but recommend it. The leaves ſhould be taken up in May, before the ſtalks appear, for they then contain the richeſt and the moſt abundant juice. If the ſucceſs anſwers what is related of it, the propagation will be very eaſy, for it is a perennial plant, and encreaſes at the root abundantly.

CHAP. LXXXIV.

Of ſquinancywort.

WHERE we have poſitive knowledge, we ſhall enlarge upon the articles propoſed for the improvement of the farmer's buſineſs: but where only the report of others comes before us without perſonal experience, leſs will be ſaid upon the ſubject: but as the intent is to cover ground of little value with uſeful products, we ſhall omit nothing which comes recommended upon good authority. We treat here of a ſmall and unconſidered weed, common enough upon ſome grounds, which produce little of value, and capable of being produced abundantly in others; concerning which we have undoubted teſtimony, not only that it may be uſed in dying, but that it is ſucceſsfully in ſome parts of the world: ſupplying the place of MADDER.

Squinancywort is a plant of the ſame claſs with madder, though much ſmaller; and we have obſerved, in the introduction to this part of our work, that plants of the ſame claſs uſually poſſeſs the ſame qualities; therefore, it is reaſonable to ſuppoſe, that there is truth in what is aſſerted concerning its uſe in dying. Farther north the plant is yet more common than with us, and there is undoubted teſtimony, that it is there uſed for a red colour ſucceſsfully.

ceſsfully. We are, with great pains, introducing, at this time, the culture of madder in this kingdom; and there is reaſon to think we ſhall ſuccceed: but though we ſhould not raiſe that plant, which is a native of another kingdom, there can be no doubt of our ſucceeding in this, which is an abſolute weed in our own. And there is a farther advantage, that, whereas madder requires a rich ſoil, this plant will thrive upon the very barrenneſt hilly grounds.

CHAP. LXXXV.

Deſcription of the plant.

SQUINANCY WORT is a low ſmall herb, of a freſh green colour. The root is large and long, of a deep colour on the outſide, and of an orange hue within. The ſtalks are ſmooth and about eight inches high; the leaves are alſo ſmooth and narrow; they grow about the lower part of the plant, four at a joint, and in the upper part two. The flowers ſtand at the top in a kind of tuft, and they are little and reddiſh: ſometimes they are white, but in thoſe plants, which have the flowers of the reddiſh tinge, there is uſually ſome red alſo on the lower part of the ſtalk, and the root of ſuch is beſt. It is a ſingular obſervation, that in the northern countries, where this root is uſed at this time inſtead of madder, the flowers are conſtantly white. With us they are uſually reddiſh, and we have therefore more reaſon to depend upon the colour from the root.

We have it common enough on hilly ground. The Suſſex hills, and thoſe in Cambridgeſhire, abound with it, where the ſoil is chalky; and I ſaw a great deal of it very fine, upon a hill near High Wycombe, laſt year.

In any of theſe places, or in others of a like kind, enough of the root may be taken up to make a fair trial; and if it ſhall be found to ſucceed, nothing can be eaſier than cultivating it on thoſe hilly places, where we find it naturally wild.

One thing I have alſo obſerved, which may lead us to think, that without planting or raiſing it by art, we ſhall not give it a fair trial.

On the hills near Wycombe, there is a conſiderable covering of graſs of ſome length on the ground wherein it grows; on the downs in Suſſex the graſs is ſhorter, and in ſome parts of Cambridgeſhire I have ſeen it on hilly land, where there was ſtone juſt under the coat of the earth, and where that ſurface was bare. The condition of the root varies conſtantly according to this difference: where the graſs is moſt in quantity, the root of the ſquinancy wort is paleſt, where that is ſhorter and leſs, as on the downs, the root of this plant is more coloured; and moſt of all where it is naked. The reaſon is not difficult to gueſs, for the perfection of ſeveral roots depends upon the drineſs of the ſoil wherein they grow; and the power of the ſun: Valerian root, ſo famous in nervous diſorders, never has its virtue, except when it has grown on heaths; and vines yield no good wine, except the roots run near the ſurface, where the ſun can warm them.

For theſe reaſons, and from what we ſee in experience, probably the roots of this plant will ſucceed much better when they are raiſed in cultivated ground, than they do naturally under a coat of graſs: they will be large, becauſe they will have more nouriſhment, and they will be better coloured, becauſe they are more open to the ſun. This ſhould direct the firſt trial to be made with roots taken up on bare hills; and even theſe will be inferior to what would be raiſed by culture.

The owner of land, which is of the proper kind, is intereſted in this diſcovery; for he may encreaſe its value many times over, and he will all the time be doing the moſt acceptable ſervice to his country.

CHAP. LXXXVI.

Of baſtard alkanet.

WE are to add to the roots which may be uſeful in dying, that of a weed common in our corn fields, and which we have for many ages known by the name of baſtard alkanet; though we never tried how far it would imitate the qualities of that plant, from the reſemblance to whoſe exterior form it gained this appellation. The qualities of alkanet we know very well; and thoſe from whom we purchaſe that root, make us pay a very large price for it. This we have at home, and there is all the reaſon imaginable to believe it contains the ſame properties: perhaps in a more remiſs degree; perhaps not. The redneſs of the root has appeared ſo peculiar to the botanical writers, that they have in general made that circumſtance a part of its name; and in Denmark it is a common paint among the vulgar.

It is one of thoſe roots very well worth trying here; and ſince it grows wild in our cultivated lands, on almoſt all ſoils, and in none is better conditioned than on the pooreſt, there is no doubt but that if cultivated as other uſeful herbs, and allowed fields alone, it would be much finer than we now ſee it.

The plant is a foot and half high, with a few rough leaves, and little white flowers; an unſightly weed. The time for pulling up the roots for trial of their colour, ſhould be a little before the ſtalk riſes for flowering; for that is the time when the juices of the root are in their higheſt perfection. Enough of it might be pulled up in a few hours in moſt places; and a trial may be made in the manner of that, the particulars of which have been given in the account of the buckthorn bark, a private perſon cannot well do more; for the dyers is a buſineſs not to be underſtood without due information; and he would be very raſh, who ſhould judge a thing incapable of uſe, becauſe he did not know how to uſe it in a profeſſion which he does not underſtand. The beſt trial would be to get a dyer honeſtly to uſe it. And this, though perhaps too difficult to be brought about by a private perſon, might be rendered eaſy by the aſſiſtance of that ſociety we have named.

CHAP. LXXXVII.

Of root cochineal.

TO the vegetables which may be uſed in dying, we are to add an inſect which our own fields afford, and which has hitherto been neglected by us; though in Poland, and ſome other of the northern nations, it affords a colour ſo like the ſcarlet grain, that it has been called by a like name.

The inſect lives about the roots of plants, and thence has been called the root kermes, and root cochineal; as alſo the root grain, the Poliſh grain, and Poliſh cochineal.

This creature, which is ſmall and roundiſh in ſhape, is found in Poland, about the roots of a peculiar ſpecies of knot graſs, or ſcleranthus; and it has been imagined, that it belonged ſolely to that plant, and was its natural production. In the ſame manner kermes, or the ſcarlet grain, was once thought to be the fruit of the ſhrub that bears it; and cochineal the ſeed of the opuntia. The enquiries of thoſe who ſtudy natural hiſtory, have now taught us better: we know theſe ſeveral kinds are inſects feeding on thoſe trees and plants, and ſuch is the root cochineal. We have in England the plant from which this valuable dye is obtained in Poland; nor is it peculiar, as has been thought, to that one kind alone: but there yet remains a doubt whether the ſame inſect, found at the roots of other plants, has, or has not, the ſame qualities. For the herb from which it is gathered in Poland, though a native of England, is not common here; though ſome others which afford the ſame opportunity are.

This is a point that muſt not raſhly be determined: it is of conſequence enough to deſerve a trial; and we muſt have experience for it, not opinion.

Plumier found, on ſeveral kinds of trees, the very ſame inſect, which, when taken from the opuntia, is true cochineal; but though theſe had all the other characters and qualities of the animal, they had not the colour. This, however, is no proof againſt what we wiſh in the preſent inſtance, for the fruit of the opuntia has a red juice, which might naturally be ſuppoſed to fill the animal which fed on it; for it will turn the urine of thoſe who eat it red: but there is no ſuch juice in the knot graſs, on which the Poliſh inſects feed; and it is therefore natural enough to think, the dye is in the creature itſelf originally, and is not dependant upon what it eats. If ſo, it is certain we ought to puſh the enquiry; for we have it in England.

I have found it at the roots of ſome of the common hawkweeds; at thoſe of the purple ſpurry in Hyde-park, and at the heads of the roots of ſeveral graſſes, eſpecially in high and dry ſoils.

Experiments made with theſe, would ſhew whether or not they have the colour; and if they have, it will be ſoon found alſo on what roots they delight to feed.

The care of ſo ſmall an inſect may appear at firſt a ſtrange propoſal; but in the things uſed in commerce, great attention is paid to leſſer things. The cochineal, of ſuch vaſt importance to the Spaniards, is an inſect very little larger than this; and yet it is regularly bred, and managed upon the plant whereon it feeds. The ſame kind of care would doubtleſs anſwer as well, in reſpect to the propagation and produce of this kind: the only queſtion is, whether in England it affords the colour which is its only value.

Since the writing the preceding account, I found a vaſt quantity of theſe inſects about the roots of the common creeping MOUSE-EAR, on a bank near Paddington; and taking up the ſame plant in other places, I have obſerved that this creature generally, but not univerſally, is found about it.

CHAP. LXXXVIII.

Of wild marjoram.

THE wild marjoram or origanum, which decorates our road ſides in many parts of England, and which is uſed in medicine; is in Sweden put alſo to the ſervice of a colouring herb in dying. There is, in the tranſactions of the academy at Stockholm, an account of its effect on woollen manufactures; and the colour it is ſaid to give them is a ſtrong, but not elegant purple. Theſe things are abundantly worth trying here; for it is poſſible, that if employed alone with more ſkill, their colour might prove better; and it is beyond all doubt, that in various mixtures they would be alſo uſeful. The colour nature ſpreads upon the ſtalk and flowery heads of this plant, was the firſt indication the Swedes received of this quality in it; and perhaps there may be ſome good uſe made of this, by extending the trial to ſuch plants, as naturally change to fine and glowing colours, at or after their maturity.

The common craneſbill, called herb Robert, has always a red ſtalk; and toward autumn, the whole plant becomes of a very high and florid ſcarlet. This happens long before its period of decay, for it continues in this ſtate flowering and ripening ſeeds. The tutſan is another very remarkable inſtance among the plants of our own growth; and among thoſe we have from other countries the common creeper: the leaves of this often turn wholly red in autumn. The Swediſh obſervation would lead one to examine, whether theſe plants do not at all times contain a red juice, capable of uſe in dying; though it is only at one ſeaſon they ſhew it in their leaves.

CHAP. LXXXIX.

Of the cruſtaceous liverworts.

THE old names of plants have been given often idly and arbitrarily; and from their having been attributed to various plants, we ſcarce know, in many writers who have not conſidered botany, what is meant by them. This name liverwort is an inſtance: we call a green leafy ſubſtance thus, which is found on the ſides of wells; and a grey one upon heaths ſuppoſed to cure the bite of a mad dog: but what we mention in the preſent inſtance, as uſeful in dying, is a very different kind from both. Its place of growth is the bare ſurface of a rock, and its form no other than that of a grey cruſt, with a few hollow parts which are its flowers; brown in the middle, and white round the edge.

We import from the Canaries a ſubſtance very much of the nature of this, though of a ſomewhat different form; and there is evidence from experience made in other countries, that this has equal value. It tinges any thing with a fine deep purple colour. Nor is this the only ſubſtance of the ſame kind to be found in our country, which may be of ſervice in dying: it may be in our power not only to ſupply the place of the orcelle of the Canaries from products, which nature offers to us at home, but to excel it. The moſs kinds have many great qualities, which have not been regarded ſufficiently; and this of containing a valuable colour is one. If the preſent ſpecies ſhould be found uſeful in England, there is abundance of it to be collected in many places; not only the ſurfaces of rocks are covered with it, but old walls, and any other place where ſtone is expoſed to the weſtern quarter of the heavens; this is not the only quarter, but it is the principal where this moſs is found. We ſee our churches, which ſtand very much expoſed on the weſt front, covered with it; while the ſides and oppoſite end are not without it, but have it in much leſs quantity.

Dillenius, who has publiſhed a hiſtory of the moſſes, mentions this ſpecies as being able to afford an elegant red dye; and he quotes an author of great credit, Celſus, for the obſervation. We find alſo, upon enquiry, that the people in many of the northern kingdoms uſe it; nor is his the only kind which has that natural quality: there is a common grey moſs that grows on pales and trees, ragged at the edges, and black underneath, which the ſame people uſe alſo in dying the ſame elegant colour: and Linnæus, in his peregrinations, made the ſame obſervation, and mentions, in very particular terms, the extreme beauty of the colour. Theſe are common in England, and may be collected with little labour, and in vaſt abundance; nor is there any fear of deſtroying them by gathering.

The gardener knows when he clears his orchard trees of moſs, that it is very ready in its growth again; and that on old boards much more, and on rocks moſt of all. The reaſon is plain; the roots are perennial, and getting into the crevices, they cannot be diſlodged by taking off the ſuperficial part. Every piece of them is ready to ſhoot up a new plant; and the clearing away the old ſurface, only gives it air for the new ſhooting. This is the caſe in the perennial rooted muſhrooms, as has been lately moſt diſtinctly ſhewn, on account of the Italian muſhroom ſtone. The roots lie buried, and at certain periods ſend up new plants; and the part where they reach the air, is always fertile. Therefore in this caſe, an old barn that is covered with one of theſe kinds of moſs, may be a conſiderable addition to the farmer's income; eſpecially an old wall, or the weſtern ſurface of a ſtony hill. There is no probability that men of ſo diſtinguiſhed characters as Celſus and Dillenius, Linnæus and the reſt, who aſſert the fact upon their own knowledge, ſhould deceive mankind. One of their names would be ſufficient authority; and the thing being eſtabliſhed, the reſt follows: the advantage is certain, and all that ſhould excite our wonder is the long neglect.

The firſt kind we have mentioned is ſo thick, that the quantity, even from a moderate extent of wall, would be very great. Micheli, who had conſidered the moſſes with attention, mentions the extreme thickneſs of the maſſes in this, even in the name of it, and calls it the thickeſt of all. The trial would be eaſy; and if they prove equal to what we import at a large price, the benefit is not confined to the farmer, who has the immediate profit, but extends to the whole nation.

Theſe are not all the moſs kinds from which we may expect this benefit. Our excellent Mr. Ray mentions two ſorts of the ſame cruſtaceous claſs, which ſhew their purple colour externally, and are uſeful in dying. The one has purple hairy leaves, and ſpreads itſelf in the ſame way with thoſe already named, on ſtones and walls. The other has broader leaves, with ſmooth edges, and has a kind of bladders at its edges; this alſo grows on ſtones. Both theſe have the dying quality ſtrong in them; and both may be had in quantity in many parts of England.

Theſe, like the firſt named kind, afford a purple dye; but the uſe of the moſſes in this article is not limited to that colour. Every one muſt have obſerved, that common yellow cruſtaceous moſs, which makes a kind of golden roſes on old brick walls and boards every where about London, and throughout the kingdom. The quantity we have of this is ſo great, that ſuppoſing it to be of any uſe, the abundance of it is a great article in its recommendation; and this very kind, Linnæus aſſures us, is uſed in Sweden in dying, affording a very elegant and laſting yellow.

Theſe things, if brought into uſe, will be ſo many additions to the publick wealth, as well as private property; and the farmer, as well as the country gentleman, have power to try them, and are intereſted in it.

In the directions we have given in a preceding part of this book, for the working up ſuch of the wooll as is to be for the ſervice of the farmer's family, we have directed ſome cheap and common ingredients for dying it: theſe which we have here added may be tried in the ſame manner; they are all familiar and common, and they will ſave even the ſmall expence of the purchaſe of the others, and at the ſame time will ſhew what may be expected farther from them; how far experience in England will ſupport the doctrine of other countries, and which of them may be moſt worth beginning to introduce to the publick.

CHAP. XC.

Of ſome peculiar kinds of graſs.

WE have taken occaſion before to name the abundance and variety of Engliſh graſſes; but it may be uſeful here to conſider the purpoſes to which this great variety may be made ſubſervient for the convenience and advantage of life, for nature did not make them in vain.

We have, in many parts of this kingdom, a long rooted plant of the cyprus kind, which the writers on botany call LONG-ROOTED, BASTARD CYPERUS. It is eaſily known by the farmer, for it is very tall, and has tufts of brown heads, like thoſe of ruſhes growing one above another, all the way by the ſtalk. The ſtalk itſelf is round, but the leaves are three edged, and each edge is notched like the teeth of a ſaw. Mr. Ray mentions it in Cambridgeſhire, Warwickſhire, and Cornwall; and I have ſeen it in moſt other counties. Its natural place of growing is the moſt wet ground; and the farmer who has ſuch will find his uſe in planting it. A very little trouble will do this, for its roots are long and large, and there is no plant which ſpreads them ſo abundantly.

The worſt piece of wet ground whereon nothing would grow, will, by a few of theſe roots, be ſoon covered with a thick and firm turff; producing abundance of the graſs, and rendering the place paſſable. The graſs is harſh when full grown; but while the leaves are young and tender, cattle will eat it, and nothing is more nouriſhing. After this it grows to a very conſiderable heighth, and is then of all things the moſt excellent by way of thatch. Its uſe in Norway has led the other northern kingdoms to a knowledge of it; and though it is ſo frequent in their wet grounds, that it need not be planted, they mow it annually for this purpoſe, and find it laſts in thatch beyond any other materials whatſoever. The neceſſities of the poorer people in many parts of England, reduce them to have recourſe to this ſort of covering for their houſes, and it would be greatly to their advantage to uſe this kind. The common thatch, even of the beſt ſort uſed with us, is liable to grow mouldy, and decay in a very little time, and always gives habitation to vermin: on the contrary, this laſts many years, and is not ſubject to that inconvenience. Whatever is the reaſon, it is obſerved in Denmark that even birds do not build in it. There is nothing diſguſtful in it, to our apprehenſions; on the contrary, it is the ſweeteſt and cleaneſt of all the ſtraw or hay kind, and there is great advantage in being free from vermin without any inconvenience. All the time the ground whereon this ſhould be planted, is what would bear nothing elſe; and is even reduced by this plant to a ſtate of utility which it had not before.

The matting together of the roots of this plant is ſo ſtrong, that many of the floating iſlands upon the northern lakes are formed of nothing elſe; and after it has grown ſometime upon ſuch a ground, the moiſture being in great meaſure imbibed by the roots, and the whole reduced to a firm ſubſtance, the ſtuff may be cut up to the depth of three ſpades for fuel. It makes a kind of turff, not equal to the true peat, but very uſeful where that is wanting.

CHAP. XCI.

Of millet cyprus graſs.

THIS is another of the graſs kind wherewith the farmer ſhould be acquainted; for there are peculiar ſpots on which it will be very uſeful, affording an abundant growth of excellent food for cattle, though nothing elſe would grow upon the place.

It is a large and thick tufted graſs. The leaves are numerous, and very long; they are often near a yard in length, and their colour is a freſh and delicate green; they are of a tender ſubſtance, and the edges are a little rough. Vaſt multitudes of theſe riſe from the heads of the roots, and ſpread every way. They afford an excellent nouriſhment; and horſes, oxen, and ſheep, are all equally fond of them.

The ſtalk is a yard high, and has ſeveral tufts of blackiſh ruſhy flowers, growing upon it one over another. While it is young and tender, the cattle are as fond of it as of the leaves; and indeed it is equally juicy, and is in a manner covered with them: four, five, or ſix leaves uſually growing on a ſtalk, and each ſurrounding it a great way at the baſe.

The ground on which this graſs delight to grow is wet and ſhady. Theſe are qualities that render it unfit for any other good kind; and the farmer often has ſuch on his land. I have ſeen it covering the ditch ſides, round the edges of woods, with a luxuriant quantity of excellent verdure, where, without it, there would have been nothing.

If the huſbandman, or country gentleman, have any ſpot of this kind, let him in autumn order a few roots of this to be planted, one at every yard diſtance, and they will ſoon meet and cover the whole ground; and from a piece of land which was before utterly uſeleſs, he will have the advantage of better produce, than can be found on any piece of equal extent upon his ground. No ſhade is too much for this graſs. I have even ſeen it luxuriant in the middle of thick woods; and in beech woods in particular, where there are plaſhy places, it may be planted to a very great account, the ground being able to produce nothing elſe of any value; and the growth of this, in ever ſo large a quantity, being no way hurtful to the trees.

The farmer who has a mind to ſee the plant, may find it by the ſide of that little ditch, which wets a great part of the road from Pancraſs to Kentiſh town, and he will know it by our deſcription. If he obſerves with what greedineſs cattle eat it, he will ſee we have ſpoke with reaſon as to their fondneſs for it; and he will find, by the ſequel, that it is not leſs wholeſome than pleaſant.

CHAP. XCII.

Of club headed ruſh.

THE common ruſhes produce their flowers toward the top, but not abſolutely at the top of the ſtalk; they burſt out ſideways at a little diſtance below the ſummit: but there is one kind which, on the contrary, bears them at the very top in form of a club: it has been, for that reaſon, called the club headed ruſh, and it is this of which we ſpeak here. It grows in brooks and rivulets in vaſt abundance, and ſometimes on very wet ground. We would have the farmer know the uſe of every thing; and this which he uſually neglects, and ſuffers to decay where it is, will ſave him a great deal in the feeding up of his hogs, anſwering the purpoſe of peaſe, and giving the fat of thoſe creatures more firmneſs, and a better flavour.

There is nothing they are ſo fond of; and they devour the whole, root as well as ruſhes. Let the farmer, who has a quantity of this plant in his waters, drag it out as he wants it, and give it the hogs as they are feeding up. Wherever he drags it out, let him leave a few roots, and there will ſoon be an abundant ſupply again; or if he has water proper for the produce when there is yet none, let him take up a few bunches from ſome neighbouring brook, and juſt put them into the ſide of his own water, faſtening them with pegs to the bank; they will quickly fix themſelves, and ſpread over the water. He cannot miſtake the kind of ruſh, for the club-like head is a plain and diſtinctive character, and there is no care required to make it grow; on the contrary, when it has once got footing, nothing is more difficult than to extirpate it: for every fragment of the root that happens to be left in the water, will float to the bank, and there fixing itſelf, will begin the propagation of a new quantity.

Hogs are not the only creatures which will eat it, horſes are fond of it; and I have always ſeen that it agreed with them, and was a healthy and heartening food.

If the profit from ſuch articles as theſe be ſmall, the expence is nothing. They grow where no other uſeful produce would; and every little addition is worth the farmer's notice. Many a brook that runs for miles through a farmer's ground, is covered with this plant, which grows and dies unregarded; though if the expence alone of gathering it were allowed, the brook would be equal in value to ſeveral acres of the beſt of the ground.

CHAP. XCIII.

Of ſpiked reed graſs.

THIS is another of the water graſſes, which often grow unregarded by rivers, and which may be eaſily made to cover the uſeleſs ground about the banks of brooks and ditches, with a moſt valuable food for cattle.

The graſs is common enough, and eaſily diſtinguiſhed. The leaves riſe in looſe tufts, and they are large and broad; they reſemble in ſhape the leaves of reeds, but that they are ſomething ſmaller; and their colour is the ſame whitiſh or greyiſh green.

The ſtalk is five foot high. It is jointed, and has leaves on it like thoſe from the root; and at its top ſtands a ſpike of an irregular form, like that upon the rough-leaved graſs in meadows. This is not large in proportion to the plant: it is naturally of a greyiſh white, but ſometimes it glows with a tinge of purple.

The natural place of growth of this graſs, is the wet ſide of a ditch, pond, or brook. Sour and uſeleſs graſſes often naturally grow in ſuch places; and it will be vaſtly worth the farmers while to deſtroy theſe, and raiſe the preſent kind in their place.

It may be propagated either by the ſeed or root; but the root is the moſt certain way, and the trouble is very little. The labour of a few days in autumn will deſtroy one ſort, and plant the other; and one planting is ſufficient, for it is natural to that kind of ground, and never will decay upon it.

The manner of planting ſhould be the ſame in all theſe kinds; when the growth already upon the ſpot is rank and utterly uſeleſs, it ſhould be torn up and deſtroyed, and a ſufficient quantity of the roots of the proper kind ſhould be planted in its place. When the natural growth is not of this bad character, it will be enough to open the ſurface in various places, and let in ſome of the roots of the better kind, which will ſoon make their way, and produce largely.

This is more needed throughout the kingdom than can be well imagined: even in the paſtures about London, where food for cattle is of ſuch vaſt value, it is ſurpriſing what a loſs is ſuffered by the neglect. I have obſerved in many of theſe grounds, the ditch banks, and the paſture for ſome ſpace beyond them, covered with graſſes and ruſhes which no creature will eat; while they would have produced this excellent reed graſs in ſuch abundance, as to have equalled a conſiderable portion of the beſt of the ground. There are no cattle, of whatſoever kind, but eat this greedily; and it affords abundant and excellent nouriſhment. The farmer's care, when he has this graſs naturally, or by his own good conduct, on the ground, muſt be to prevent its running up to ſtalk; for that exhauſts the root, and prevents the free growth of the leaves, and their due nouriſhment. This is very eaſily done; for a labourer going along the ground with a ſcythe, may cut off all the ſtalks at a ſmall height above the leaves with a few ſtrokes: and once doing this is ſufficient; for when the flowering root is taken off in this graſs, it ſends up no other till the next year.

CHAP. XCIV.

Of mouſe-tail graſs.

OUR farmers diſtinguiſh two or three particular kinds of graſs, which they find excellent in paſturage, but they might very advantageouſly carry that obſervation a great deal farther. The graſs called the greater mouſe-tail graſs, and by ſome the long ear'd cat's-tail graſs, always affords excellent feeding, and at the time of mowing, a ſweet hay.

It grows moſt favourably in damp meadows; and it ſhould be by all means encouraged in them, not only becauſe it is a very ſweet graſs in itſelf, but becauſe the ſame ground is very apt to yield what is of a contrary quality.

The farmer needs not tear up other graſs for this, nor plant it root by root: we are not about to recommend to him practices ſo chimerical; but by a very eaſy proceſs, he may enrich his worſt wet meadow land with this to great advantage.

Firſt let him know the kind diſtinctly. The leaves are very numerous, and they are narrow; ſharp pointed, and of a freſh and fine green. The ſtalk is two foot high; and at its top ſtands a long and ſlender ear; rounded and ſomewhat harſh to the touch, and armed with ſhort upright beards. At firſt it is green; but when it grows toward ripeneſs, it becomes purpliſh. This is the natural ſtate; but ſometimes from defective nouriſhment it is white. The leaves of this are eaten generally by all ſorts of cattle, the larger and the ſmaller equally; and there is none whoſe ſtalks ſucceed better in hay. It is the beſt graſs a wet meadow can bear; therefore let the farmer get it into all ſuch ground.

At the time of hay ripening, let him look over his own and his neighbours grounds, and mark a field that has a great deal of this graſs. Let him obſerve when this is cut, and where the hay is carried; and let him collect a large quantity of hay-ſeed from it; and in the time of his ſpreading his manure, let him ſow this ſeed largely upon the ground. It will readily grow, becauſe the ſoil is ſuch as it moſt naturally loves, and the increaſe in quantity will be very great, as well as the improvement in the quality of the graſs and hay.

We have, in the preceding volumes, directed the farmer in the choice of hay-ſeed, always to have a regard to the place from whence it is obtained. But it is an article of yet more advantage, to ſelect a piece of ground for the choice of ſeed, where a kind of graſs has made the principal part of the crop, that is not only perfectly ſuited to the ſoil, but is alſo excellent in itſelf.

CHAP. XCV.

Great water graſs.

IF the farmer has a piece of ground that is yet wetter than that we have laſt underſtood, under the name of the more damp kind of meadows, let him not attempt to raiſe in it the graſs there deſcribed; for it will bear only a certain degree of moiſture: but he is not without reſource in that caſe, provided he knows the ſeveral kinds of uſeful graſſes. This which we treat of in the preſent chapter, will grow in the very wetteſt paſture ground; and its large leaves and quick ſhoot after cropping, make it a ſource of great plenty. No graſs is ſuperior to it in its qualities of feeding oxen and ſheep, with an innocent and rich nouriſhment.

That he may know this graſs, let him obſerve the following characters. The leaves are numerous; and they are of a pale green, large, and conſiderably broad: they riſe in great cluſters, and grow again very quick after feeding or cutting. The ſtalk is ſlender jointed; of a pale whitiſh green, and five foot high. The flowers grow in ſpreading heads, compoſed of ſmall ſpikes. They are of a pale brown colour, and they have no beards or awns.

The graſs is not uncommon in the damp parts of paſtures; and it ſhould be raiſed in the ſame manner as the preceding, in thoſe grounds that will ſuit it, by ſaving hay-ſeed from ſuch as has been cut where this kind grew in abundance; and ſowing this in the latter part of autumn, juſt before the laying on the manure.

The advantage will be ſeen in ſome degree the following ſummer, and the general crop will be improved by it; but the great benefit will be the year following, when the roots have ſtrengthened themſelves, and the graſs grows up in thick tufts. It will then be a very fine addition to the crop of hay; and the young ſhoot of a ſtalk being cut off in the mowing, for it flowers later than the generality of the meadow graſſes, all the ſtrength of the root will be employed to ſend up leaves during the reſt of the ſummer, which will vaſtly increaſe the quantity of food for the cattle. It is not ſaying too much to affirm, that one fourth of the whole may eaſily be added to the graſs of the generality of paſture grounds, by a proper attention to this one article of ſowing hay-ſeed of right kinds.

CHAP. XCVI.

Of tall meadow graſs.

WE have mentioned the graſſes which are peculiarly ſuited to ſuch meadow grounds, as are damper than ordinary in different degrees; we here ſpeak of a kind that will grow very ſucceſsfully upon places that are abſolutely watery. Such ſpots are not uncommon in low meadow grounds; and in the natural courſe of things, their produce is either leſs in quantity than that of other ſpots, or it is inferior in kind: and in ſome caſes there grow in theſe parts graſſes of the ruſhy kind ſo coarſe, that no cattle whatever will eat them. The graſs we mention in the preſent chapter, will grow ſucceſsfully in theſe; and make the product equal to the beſt of the other parts of the ground. Let the farmer obſerve it by theſe characters.

It has ſomewhat of the look of the common tufted meadow graſs, but it is much taller. The leaves are numerous, long, and moderately broad, and their colour is a pale green. The ſtalk riſes to three foot high, and is jointed at large diſtances: the tuft of flowers is long and large, and it hangs all on one ſide of the ſtalk: the grains of which it is compoſed are browniſh, and they have no beards.

Let the farmer look into the wet meadow grounds of his own, and his neighbours farms, and when he has found a ſpot that abounds with this kind of graſs, let him take care to procure ſeed from the hay, among which it is made, and ſow this upon that kind of ground: he will make a vaſt advantage.

CHAP. XCVII.

Of narrow-leaved mountain graſs.

WE have hitherto ſpoke of the graſs of meadows and wet places: this is peculiarly adapted to hilly grounds, and is more worth the notice of the country gentleman, as well as farmer, than many which are more conſpicuous; its peculiar quality is agreeing with ſheep. It is the moſt proper food for that creature, and preſerves them from diſeaſes, and it gives that peculiar flavour to the fleſh, which we admire ſo much in what is called the Banſtead mutton. Add to this, that it grows on the worſt ſoils, and we ſhall ſee that it has many recommendations. Its natural quality is to ſhoot up an innumerable multitude of leaves as faſt as they are cropped; and the nearer the root it is gnawed, the more freely they grow. The graſs is in itſelf ſmall and low, but this abundance of it makes amends; and it grows equally at all ſeaſons.

That the farmer who deſires credit for his ſheep, or the country gentleman who values the flavour of the meat for his own table, may know the kind of graſs we have recommended; he is to obſerve the following characters. It is a low and ſmall ſort. The root is fibrous and blackiſh; the leaves are narrow, ſhort, ſharp pointed, and very numerous; and their colour is a ſtrong, but not a florid green. The ſtalk is about eight inches high; and the tuft at the top is of a pale brown, when ripe. It is compoſed of a multitude of ſmall heads, without awns, and they are diſpoſed in a feathered manner.

The natural place of growth of this kind is on hilly paſtures; and the more dry and expoſed they are, the more likely it is to be found there. The ſpot is to be marked where ſuch graſs is ſuffered to ſtand for hay; and ſeed is to be ſaved from it. This ſhould be ſown on the ſame kind of ground, for it will not take root on any other; and the more expoſed the paſture is, the better it will grow. The ſheep will find it out before the eye of the farmer; for he will perceive they are fond of that place in particular, and thrive in it: and from that time he will ſee the turf thicken on the ground.

CHAP. XCVIII.

Of knotty-rooted oat graſs.

THIS is a graſs which grows in ground choaked up with buſhes, and finds its nouriſhment almoſt under any diſadvantages; at the ſame time it is a very rich and wholſome food for cattle. Our farmer will underſtand his intereſt too well, to have any grounds over-run with ſhrubs; but from this direction of nature, as to the place of growth of that graſs, he may find a leſſon of advantage. The hedge ſides in his paſture grounds are the leaſt profitable part; but by ſowing this graſs on that part of the ground, he will bring it to a condition, at leaſt equal in value to any of the other.

The roots of this graſs are compoſed of many thick and knotty joints; they are of a brown or blackiſh colour, and hung about with many fibres. The leaves are of a freſh green, moderately broad and ſharp pointed. The ſtalk is two foot and a half high; and the tufts of flowers lean on one ſide; theſe are compoſed of pale brown heads, and every other of them has a ſmall beard, the intermediate ones being naked. The root is the great article of diſtinction to the farmer. If on pulling it up, he finds that to conſiſt of a chain of knotty pieces, he may be ſure he is right.

The ſeed of this he is to ſave from hay, among which there is a great deal of it; and he muſt ſow it along the hedge ſides in his paſtures. The ſhoot will be but thin the firſt ſeaſon; but by the ſecond, he will ſee the reward of his trouble: he will know the blades of this graſs by their height and colour; and he will find the edges of his paſture are by this means not only as well covered as the middle, but that the cattle feed upon this part more luxuriouſly than the reſt, and no graſs is more nouriſhing or wholſome.

Only one caution he is to take, which is to keep hogs carefully out of any paſture where this graſs is ſown. The knotty roots of this kind, are the greateſt delicacy that hogs know; and they will tear up all the ground for them wherever they ſmell them. I have ſeen a hog root up two yards of earth on a common, for the ſake of two or three roots of this graſs; we may gueſs therefore what would be the conſequence of their getting in, where it was abundant.

CHAP. XCIX.

Of ſea dogs graſs.

THE uſe of this graſs is of a very limited nature, but it is worth the farmer's knowledge. It naturally grows upon the ſea coaſt, and it will not ſucceed any where elſe, nor is its uſe ſo great as that of the others: but there is in England a great deal of ſandy coaſt, which is at preſent of no uſe or value, on which this might be ſown with very little expence or trouble, and where it would grow readily.

It is a tall and harſh-looking graſs; the roots creep in the manner of couch graſs, and at leaſt as faſt, and as far. They are white and well taſted. The leaves are long, and conſiderably broad; their colour is a blueiſh green, and they are of a very firm ſubſtance. The ſtalk is a yard high, or more; and at the top of it ſtands an ear like that of wheat, but that it is thinner.

The natural place of growth of this graſs, with theſe characters, will prevent the farmer from being deceived in the kind; and it is ſo common in many places about our coaſt, that a labourer may, in half an hour, mow enough of it for ſeed for an acre. Let the farmer thraſh it when it is dry, and in the following autumn ſow it upon a piece of ground of this kind. The firſt good effect of it will be to fix the ſand, which was before blown about by every wind. This ſervice it performs in Holland, to the great benefit of many places there; and this it will do ſecurely, though the matter be ever ſo looſe. The leaves while young, are an excellent food for ſheep. Oxen and horſes will eat them, when they are more grown.

The roots which are ſpread over the ground in a vaſt abundance, are an excellent food for hogs. They have alſo another uſe, to which I hope we ſhall never have occaſion to put them in England; they make wholeſome bread. In ſome of the northern kingdoms, they are gathered and ſold in ſeaſons of ſcarcity for this ſervice; and the people find them as healthful as corn.

CHAP. C.

Of vipers bugloſs.

WE are making the farmer acquainted with herbs which may be beneficial to him, and which are not commonly known for thoſe ſervices. This is of a peculiar kind; its uſe is for honey: but it is ſo eaſily propagated, and ſo agreeable a plant to look at, that it will be worth the care of the farmer, who has any quantity of bees.

It is very conſpicuous on our dry ditch banks, and very beautiful. The ſtalk is ſpotted with red; the leaves are rough, and the flowers are of a beautiful blue, and they are conſiderably large.

If a few of theſe plants be pulled up when the ſeeds are ripe, theſe will be eaſily ſhook out, and being ſcattered over the ground in the farmer's yard under walls, and upon the walls themſelves, they will ſhoot regularly the next ſpring, and produce abundance of plants, which will flower in perfection the ſame ſummer. After this the plant will take care of itſelf; and every year there will be abundance of it on the ground. The love the bees have for it, will be ſeen by the great attention they ſhew its flowers; and the effect will be found in the honey, which will be not only the finer, but the more in quantity in proportion, as they feed more largely on this plant.

CHAP. CI.

Of the black Currant.

THE ſmall ſhrub, which produces this fruit, is very well worth the farmer's notice; and perhaps may prove of greater importance than has yet been known. It is a native of England, and is hardy enough to live any where in hedges. It muſt not be conſider'd as a proper ſhrub to make the fence; but it may very well be planted here and there among the reſt for the ſake of its fruit.

We were long acquainted with the uſe of theſe in tarts before Mr. Baker, a very worthy member of the royal ſociety, revived their uſe in ſore throats, for which they were formerly ſo famous in England, that the ſhrub was called *Squinancy wort*, that is, *Quinzy herb*; and for which we do not at this time know a greater medicine.

It has been long known in France, that this fruit is good for the feveriſh diſpoſition of cattle, and that when a purging comes on with ſuch an illneſs, it is a ſovereign remedy. Inſtinct directs cattle to find it where it is native, and if it were planted in hedges, they would not fail to ſeek it out for their own benefit. The terrible diſeaſe among the horned cattle, which has raged ſo many years throughout great part of Europe, always is attended with an inflammation of the throat, which continues through the whole inteſtinal canal. From what we know of the great effects of this fruit in ſore throats among our own ſpecies; and in the purgings and feveriſh illneſſes of cattle, may it not be reaſonable to expect great good from it in this terrible diſorder.

CHAP. CII.

Of avens.

THE farmer will ſee avens plentiful enough unſown in his hedges, and he may find great uſe in the roots of it for the preſerving his malt liquors.

The plant is two foot high, with broad rough divided leaves, each conſiſting of two pairs of ſmaller, and an odd one that is much broader than the reſt. The flowers are little and yellow, and the ſeeds ſtand in a kind of roundiſh heads, which hang to the cloaths in the manner of burrs,

burrs. The root is thick and brown, and has a very agreeable ſmell.

A ſmall quantity of this put into malt liquor with the hops, prevents it from growing ſour: if too much be added, it gives the beer a high ſpicy flavour, but very agreeable; and there are many families in Norway, where the plant is as common as in England, who chuſe this flavour ſo as never to be ſatisfied with malt liquor that has it not. It is a conſtant and certain obſervation, that the beer, which has this high flavour of the root, never ſpoils.

CHAP. CIII.

Of kidney vetch.

WE have yet two or three plants to recommend to the farmer, highly worthy of his notice. The common kidney vetch is one; it grows wild with us, principally in dry upland paſtures, and will thrive very well in a chalky ſoil. There is no herb that feeds ſheep more ſucceſsfully, and the quantity is very great that it adds to theſe paſtures.

The plant is very conſpicuous, and particular in its aſpect. The root runs into the earth with many very long fibres. The ſtalks are a foot long or more: eight or ten of them riſe from each root, and they partly lie upon the ground, and partly riſe obliquely upwards. The leaves are formed like thoſe of the vetches; and the flowers ſtand in cluſter'd heads as big as wallnuts. The ſeveral pairs of ſmaller leaves, of which each entire leaf is compoſed, are oblong and of a pale green; and there is an odd one which terminates the foot-ſtalk, and is larger than any of the others. The flowers themſelves are ſmall, and their moſt common colour is yellow; but they are ſometimes white, which is not very wonderful; and ſometimes red, which is more ſtrange. This is indeed ſo much out of the common courſe of nature's variations, that the plant has been ſuppoſed a diſtinct ſpecies. Linnæus has a very ſingular obſervation on this ſubject; it is, that the colour of the flowers in this plant is influenced by that of the ſoil wherein it grows. Yellow we know is natural and original: he obſerves that they are red when the plant has grown upon a reddiſh ſoil, and white when on a white one. This is not perfectly verified by what we ſee in England; for we have yellow flowers on this plant on our chalk hills; but there may be truths in nature that are not univerſal, and his authority is not to be queſtioned. There is the more attention due to this circumſtance, becauſe ſheep, for whoſe food we propoſe it ſhould be raiſed, are fonder of it when it has yellow flowers than any other colour. This I have obſerved. Therefore let the farmer ſave his ſeed from ſuch plants.

It will take root freely in all dry paſtures, whether the ſoil be chalky, ſandy or gravelly; and I have ſeen it very thick wild in the bottoms of old gravel pits, where the ſurface was no other than a remain of the ſame looſe ſtones that had been dug up above, and where not even graſs could find nouriſhment.

This muſt be a great recommendation of the plant, and its qualities much more. There may be ſeveral ways of raiſing it; but from a ſmall experiment I made laſt year, I ſhould propoſe the following as moſt certain of ſucceſs.

Let the farmer chuſe an upland paſture with a gravelly ſoil, which has hitherto bore very little graſs; he will need do no more than plow this up for the purpoſe; it will need no clearing, for weeds will not grow in it. Let it be plowed in autumn, and let ſome ſeed of the kidney vetch be ſaved from the wild plants, and mixed with twice its quantity of good and proper hay-ſeed. We have directed the farmer in his choice already, of the graſſes from which it ſhould be ſaved for particular places.

Let this mixt ſeed be ſown thick upon the land, and harrowed in; and let there be ſcattered over it a little lime, which has been to be ſlaked by the air.

No more care is needed; a crop will riſe, in which the kidney vetch will have a great ſhare, and toward the middle of the following ſummer, it ſhould be mowed. The hay will be very valuable; and after this the roots will ſoon eſtabliſh themſelves ſo well, that the ſheep may be turned into it, as into a common paſture.

It will cure them of all the illneſſes they may have contracted by feeding in low wet grounds; and there is no food whatſoever, on which they will thrive ſo faſt. The paſture will keep itſelf up afterwards for many years; and if at length it be found to grow poor, there will need nothing more than to plow it up, and new ſow it again.

It is a great advantage that this plant will grow freely with graſs, for there are ſome excellent ones which will not: but this naturally riſes in paſtures. The ſpot upon which I tried it was an old gravel walk, and it ſucceeded perfectly: I can therefore, from experience, recommend it on gravelly ſoils; and from what I ſaw can aſſure the farmer, not only that ſheep feed on it with great pleaſure, but that it is wholeſome and nouriſhing for them.

Probably it will anſwer as well on chalk and ſand. The farmer, who is not inclined to make the full trial of it here propoſed, may ſcatter a few ſeeds in autumn, upon his upland paſtures, and mark the conſequences. He will be ſoon led by theſe to ſow it at large.

CHAP. CIV.

Tare everlaſting.

THIS is a yellow flowered plant, common in ſome of our paſtures, and worthy to be introduced into them all. The farmer will eaſily recollect it, by the following ſhort deſcription. The plant is irregularly branched, and a foot and half high; the leaves grow in the manner of tares, only that there are but two at each foot ſtalk. Their colour is a duſky, and ſomewhat blueiſh, green; the flowers are yellow, and ſhaped like the flowers of the tare, and they grow in tufts on ſlender foot ſtalks, from the boſoms of the leaves. After them come pods with roundiſh ſeeds, like little tares.

It is common among buſhes and in hedges; and in many paſtures mixes itſelf among the graſs, from ſeeds ſcattered from the hedge plants.

Wherever this happens, it is a great advantage to the ground, for cattle are very fond of it, and it is very nouriſhing. The farmer has it in his power to make this benefit univerſal.

Let him order a quantity fit to be gathered when the ſeeds are hardening, and let it be laid upon a dry bank, and ſometimes turned till fit to thraſh; then let the ſeeds be carefully got out, and let them be ſown over the paſture ground among the graſs, at a time when it has juſt been eat down at autumn; and the cattle have been turned off, to give it freſh growth. If a ſmall ſcattering of common manure be thrown on at the ſame time, it will cover the ſeeds, and diſpoſe them to ſhoot; and the next ſpring the plants will appear in abundance, after which they will never be wanting in the paſture. The name by which the Engliſh herbariſts call the plant, ſhews that it is durable in the ground; and indeed, with a tolerable eſtabliſhment once given, it will never be out of it. It will cut with the hay; and will give that a heartening virtue, beyond what graſs can have alone; and it will riſe again after the cutting exactly as the graſs, and flouriſh with it; thickening the bottom, and adding greatly to its natural qualities. Horſes and oxen, as well as ſheep, are very fond of the taſte of it; and one as well as another ſhew always a peculiar liking to the paſtures where it grows.

There is no graſs ground on which it will refuſe to grow; but it ſucceeds beſt of all, when there is ſome moiſture. The farmer ſhould conſult this; and he ſhould obſerve alſo, that in the ſtate of nature it grows very well under the hedges: therefore he ſhould ſow it in a larger quantity toward the ſkirts, than in the middle of his field. It is not conceived how great improvements might be made in graſs farming, by theſe ſmall additions.

CHAP. CV.

Of many flowered vetchling.

THIS is another of the pulſe kind, which is a native of England, and which, though it is generally a uſeleſs weed in hedges, or a miſchievous one among corn, may be made very uſeful in paſture grounds. The ſtalks and leaves are an excellent nouriſhment for all kinds of cattle; and the plant will always ſow itſelf, if once properly introduced into the ground.

The farmer ſees it moſtly in hedges, where, though uſeleſs, it is very beautiful. It grows among the buſhes to three or four foot high; and is conſpicuous for its long tufts of beautiful purple flowers. The ſtalks are weak, and of a pale green; the leaves are compoſed each of two ranges of ſmall ones, and they are of a pale, or ſomewhat blueiſh green. The flowers in their long tufts are ſupported upon ſlender foot ſtalks; and they are ſucceeded by numerous pods, with ſeeds like the ſmalleſt kinds of tares.

It is impoſſible but the farmer muſt have obſerved ſo beautiful a plant as this in the hedges; and he might have ſeen, wherever it is, that the horſes and cows tear the fences to pieces to come at it; draggling out its long ſtalks, and eating them with a voluptuous appetite. This might have told him the value of the plant: for nature, their guide, never errs; and whatever they are particularly fond of, is always wholeſome for them. But though hedges be the natural place of growth of this herb, it will ſucceed very well among the graſs in paſtures; and as it there does not ſpend itſelf ſo much in an upright long ſtalk, there is the greater quantity of leaves and young branches.

The ſoil in which it will thrive beſt is a tender loam; and where there is a piece of ground that has a good depth of this earth, and ſome moiſture, it will be eaſy for the farmer to encreaſe its value one third, without any additional expence, only by ſowing this plant.

Let him order a quantity of it when the pod is near ripe to be gathered in the hedges; and getting out the ſeed, as we directed in the laſt article, let it be ſowed among the graſs in the ſame manner: giving it a covering of ſome common manure. Pond mud is the beſt of all.

The next ſpring many plants will appear; and from that time the quantity of it will encreaſe in the graſs. For the roots are perennial, and there will riſe new plants continually from the ſeeds of ſuch of the old ones, as have chanced to ripen. The cattle of all kinds will like the paſture the more for this, and thrive the better in it; and the hay will have the ſame advantage as the freſh graſs: it will be more agreeable to them, and more heartening.

The farmer ſhould underſtand the qualities of all thoſe herbs which mix themſelves naturally, or may be mixed by art among the paſture; for there are ſome very hurtful, as well as others of excellent utility. We are ſpeaking here of thoſe he ſhould favour in their growth, and we ſhall direct him which he ſhould deſtroy. At preſent his knowledge is ſo limited, that in general he conſiders every thing he does not ſow, as a weed; and he thinks all weeds muſt be hurtful. Thus under the notion of clearing a paſture ground from weeds, I have ſeen this plant and the following, as well as that laſt deſcribed, pulled up under this denomination, in common with fern and thiſtles, though it would have been worth the farmer's while to have brought it into his ground at ſome expence. Our own country affords many plants equally valuable with thoſe we raiſe from foreign ſeeds, and they may be introduced with much leſs trouble. We ſhall propoſe them here; and the farmer may be aſſured no one will be recommended to him, but what is certain of ſucceſs from more than one trial, and more than our authority. The correſpondences with which we have been favoured in Denmark and Norway, particularly that of the late great and excellent biſhop of Pantoppidan, have furniſhed many obſervations on this ſubject;

ject; and ſtill more are owing to that great light of the preſent age, Linnæus; whoſe talents in the knowledge of plants obtained him the favour of his ſovereign, and whoſe whole ſtudy has been ſince to ſerve his country. He travelled for this purpoſe through all the northern provinces, and acquainted the farmers of one part, with what he learned from thoſe of another: and his pupils tread in his ſteps to this day. Himſelf has publiſhed an account of the plants eatable by cattle; and one of his ſcholars, of the ſeveral uſes to which the native herbs of that part of the world may be made ſubſervient in common life. From theſe and the like works, and from the writings of our ſeveral correſpondents, we have ſelected all that appeared uſeful to the Engliſh farmer, and have here given, and ſhall give the reſults of all the experiments they have made to confirm them; together with what has been done farther in this way at home. The plants of Norway, Denmark, and Sweden, are the ſame with thoſe of England, with a very few exceptions: the farmer has the opportunity of ſeeing the uſes that have been made of them, and we hope he will attempt ſo cheap and eaſy improvements, as thoſe we recommend from their practice, and from our own obſervations.

CHAP. CVI.

Of the ſea pea.

THE farmer who is accuſtomed to the cultivation of the annual pulſe, ſuch as peas, tares, vetchings, and chiches, will be ſurprized to hear us ſpeak of perennial rooted plants of the ſame kind: but he may be aſſured, there is no error in this; and we are about to add to the number, an abſolute pea, which produces fair and eatable peaſe in pods not unlike the common, yet does not periſh as that after they are ripened, but has a root that lives many years.

This plant is like the common field pea, but more robuſt. The leaves have more numerous parts, and the ſtalk is angulated; the flowers and pods alſo reſemble thoſe of the common kind; but the peaſe are ſmaller, darker coloured, and bitteriſh.

Famine taught the people of Suffolk once to eat them; and they thought heaven had ſent them that year. But though they are not to be commended for our tables, they are excellent for feeding hogs; and they will grow upon the ſea beech where nothing elſe can. This is a good cauſe for their culture in ſuch places; but there is one reaſon we particularly mention them again, which is, that a great part of their value depends upon a particular time of eating them. If they be ſuffered to ſtand till the peaſe are ripe in the pods, they ſhrink up, and grow hard, ſmall, wrinkled and bitter: on the contrary, if they be cut as ſoon as they are grown to their full bigneſs, without ſtanding to harden, they ſwell out before they dry, and they contain a great deal more meal, and that better taſted.

CHAP. CVII.

Of birds foot trefoil.

THIS is a plant that mixes itſelf with the graſs in many of the farmers grounds, without his care or trouble, and never fails greatly to improve them. It is in his power to introduce it univerſally. There are no ſoils on which it will not grow, and there is none whereon it will not make a great improvement.

The plant is ſo common, that it cannot but be eaſily known. It is not above ſix or ſeven inches in height. The ſtalks are numerous, and they are thick ſet with leaves, every cluſter of which conſiſts of five; two of theſe ſtand cloſe to the ſtalk, and the other three in the manner of the trefoils, at ſome diſtance. The flowers grow in tufts at the top of the ſtalks and branches; and they are yellow. The ſhape is that of the pea flower, but ſmall. The pods which follow theſe are ſtrait and hard; and they ſpread from the top of the ſtalks in the ſame manner as the flowers. They have been ſuppoſed to repreſent the foot of a bird. The ſeeds are large and brown.

The plant is common enough, and its ſeed very eaſily procured. Let a quantity of it be pulled up when the pods are ripening, and thrown together in a barn, and when they are well dried, let the ſeed be thraſhed out.

The beſt way of ſowing it is what we have named for the others, to ſcatter it over the ground among the graſs, at a time when the cattle are about to be turned into another paſture, and to ſpread over it a light covering of pond mud, or other appropriated manure. The ground will be gilded with the flowers the ſucceeding ſeaſon; and the plant will afterwards take care of itſelf. This paſture will be found at once more acceptable to oxen, cows, and ſheep, than others, where there is none of the plant here deſcribed; and by obſervation afterwards, it will be found to agree with them as eminently in regard to their fleſh, as it is pleaſing to their palate.

CHAP. CVIII.

Of melilot.

THE huſbandman has been accuſtomed to hear of melilot as an herb for plaiſters, and he knows no more of it; but we are to recommend it to him on another ſcore, its excellence as a food for cattle. It is a kind of trefoil, but more excellent than many which are diſtinguiſhed for their uſe in feeding; it is as eaſily propagated as common clover; and it will grow any where. Theſe qualities ſhould recommend in many places, where there are poor paſtures that would be immediately made rich by ſowing it.

It is a common wild plant in moſt parts of England, in hedges and among thickets, and there the huſbandman muſt get it for ſeed. It uſed to be cultivated in the gardens where medicinal plants are raiſed; but ſince the ill behaviour of the apothecaries, who uſed to make the plaiſter green with verdegreaſe, has occaſioned the plant being left out, that it may not be green, the gardeners have thrown it out of their ground: it is however common enough in many parts of the kingdom, and the ſeed may be eaſily obtained from the wild plants.

It is two foot and a half high. The ſtalk is a pale green, and ſends out many branches: the leaves ſtand three on every foot ſtalk, as in the trefoils, and they are long and narrow. The inſect kind are ſo fond of the plant, that the leaves are uſually gnawed to pieces all along the edges; and this is ſo univerſal, that it may be added to the farmers rules for knowing it. The flowers are ſmall and yellow, and are in form like thoſe of the other trefoils: but they are much more numerous. They hang in long cluſters, and make a ſingular appearance. The ſeed veſſels are a kind of pods, ſhort and rough; and the ſeed is moderately large.

It is very eaſy to pull up a number of theſe plants toward autumn, when the ſeed is full grown in the pods; and they ſhould then be uſed exactly, as the ſeveral other kinds we have named before. Late in autumn is the beſt time to ſow them, and they will ſucceed very well if ſprinkled pretty thick over the ground among the graſs. Horſes, ſheep and oxen are all fond of the plant; and the effect it has in feeding, is equal to that of any of the foreign graſſes.

One caution it will be proper to give the farmer: that he does not turn milch cows into theſe paſtures, for this is one of the herbs which communicate their taſte to the milk.

The huſbandman is content to ſee his graſs grounds over-run with miſchievous plants; particularly the crow foot kinds, which are often as thick as if they had been planted there; but he takes no notice of theſe uſeful herbs, which will grow as freely, and which he may ſow in thoſe grounds without expence. The more of theſe improving herbs there are among the graſs, the leſs room there will be for others which are uſeleſs or hurtful. This ſhould be a great conſideration in the time of laying down grounds for graſs that had been in tillage: it is in this caſe in the farmer's choice whether he will mix theſe uſeful herbs among the graſs, or leave the winds to ſcatter in the ſeeds of hurtful ones. There is no other chance; for graſs never grows pure: and it certainly is worth his while to regard this article. There is no time ſo favourable for ſowing them. For though they will make their way by degrees among eſtabliſhed graſs, yet they will ſucceed much better, when they are thus made to riſe originally with it.

The farmer knows the advantage of clover ſown among his ray graſs. Theſe are all improvements of a like kind, and many of them better.

CHAP. CIX.

Of yellow medick.

THIS is an excellent trefoil, with a laſting root; and would ſucceed very happily either as a mixture among the natural graſs of meadows, or in tillage land, under the ſame management with the artificial graſſes.

We have it wild in England, but it is only in ſome particular places; and the plant is not ſufficiently known. It is a robuſt herb a foot or more in heighth, and divided into many branches: the leaves ſtand in threes, in the manner of thoſe of the other trefoils, and they are broad and oblong. The flowers are yellow, and they are ſhaped like thoſe of the trefoils. They ſtand in longiſh cluſters, in a kind of cloſe ſpikes. The ſeed veſſels are a ſort of flat wreathed pods; and in theſe are ſmall brown ſeeds.

We have the plant in many parts of Buckinghamſhire and Hertfordſhire, and in other places. It grows about the edges of hilly paſtures, and ſometimes in corn fields; often alſo among thickets and hedges. The plant ſhould be cut when the ſeeds are full grown, and laid to dry; after this the ſeeds ſhould be thraſhed out, and ſown, with the advantages we lately named, particularly when a piece of corn land is to be laid down for graſs. The ſituation in which nature ſhews the plant, ſhould alſo be regarded; and the places where it is added to the natural graſs by art, ſhould be large cloſes that lie high for it will not ſucceed in ſmall encloſures, that are down in bottoms.

If there be not opportunity for this, let the ſeeds be ſown as we have directed for the others in autumn, over a field of natural graſs. The benefit of this plant in the northern parts of Sweden is ſo great, that the farmers eſteem it the very beſt of all their feeding herbs. There is no reaſon thoſe of England ſhould not have its full benefit, ſince it is native of the country: and there is a double advantage in thoſe plants, which will ſucceed either alone, or with the natural graſs, becauſe they may be uſed on ſo many occaſions. The Swedes are confident this plant encreaſes the quantity of milk, and alſo enriches it; when their cows feed in paſtures where it is abundant. This is an article of great conſideration, becauſe many of thoſe plants which encreaſe the quantity of milk, impoveriſh it at the ſame time.

CHAP. CX.

Of melilot hop trefoil.

WE have juſt recommended *melilot* itſelf for an excellent feeding herb; and in the preceding volumes we have named the *hop trefoil.* The farmer is to underſtand, that we are not repeating in this place what we had ſaid in either of thoſe; or treating of the ſame plant. This peculiar kind of trefoil, which from its mixed appearance ſome of the authors who have written of plants, have referred to the melilot kind, and ſome to the hop trefoil, is truly of a middle nature between both, and not improbably is one of thoſe which are ſuppoſed to have originally riſen from the mixture of the plants, as the melilot and hop trefoil. But it may ſerve to ſet aſide that error. The horſe and aſs form together a mule, but the mule cannot propagate its ſpecies. So the ſpeedwell and vervain, in the Upſal garden, have formed a mongrel plant, but it ripens no ſeeds that will grow. This plant has a great reſemblance to both thoſe from which it is named, though it ſufficiently differs in ſeveral other reſpects from either: but it produces ſeeds in abundance which propagate it, and therefore it has not been ſo produced. This is plain in the preſent inſtance; and therefore we may reaſonably believe, that all the other plants, ſuppoſed to have been raiſed by a mixture of two kinds, and which we find permanent, have been erroneouſly aſcribed to that production. Here and there an inſtance may happen of a third plant, produced from the *farina* of one ſpecies falling on the *ſtigma* of another; but it muſt be very rare; becauſe the globules of farina are not likely to ſuit any ſtigma but that of the plant to which they belong: and when it happens, it goes no farther, the new plant not being able to ripen perfect ſeeds.

This point we thought needful once to ſet right to the farmer, becauſe the doctrine is now aſſerted by ſome very warmly, and becauſe it would lead him again toward an error, from which ſome have been difficultly recovered, that of believing the poſſibility of a change of ſpecies: for this would come toward the ſame mark. He may be aſſured things are as they were from the beginning; and will continue ſo to the end of the world: and that this plant which has a reſemblance in part of the hop trefoil, and in part of melilot, is yet a diſtinct and original ſpecies; and is as different from both of them, as they are from one another.

This plant is upright but weak, and is about ten inches high. The ſtalk is ſquare, and of a pale green. The leaves ſtand three on each foot ſtalk, and they are ſmall, broad, and of a ſtronger green than the ſtalk. The flowers grow in little tufts of an oblong form, and they are ſmall, and of a gold yellow. The ſeed veſſels are numerous, and ſtand in an oblong head.

It is a native of our paſtures in ſome places, and may with great advantage be brought into the ſame uſe in others. We have accounts from Denmark, and alſo from Sweden, of the great benefit the cattle find by feeding on it; and the ſeed is ſo abundant, and ſo eaſily collected, that we cannot but recommend it earneſtly to the farmer here.

It is not of the nature of thoſe which can be raiſed alone for artificial graſſes in a laſting tillage; for it is only a biennial, but it grows as freely in fields where there is graſs, as where there is none; and in poor paſtures, on a dry ſoil better than any other.

The huſbandman often has dry, gravelly, or ſandy paſture ground on a hill, at a diſtance from his farm; which produces very little, and which it would be very expenſive to manure: beſides that the benefit, even of the beſt dreſſings, would not be laſting; becauſe they would be waſhed off by the rains from the nature of the ground. It's theſe he may beſt improve by the addition of this plant. Let him employ a labourer to pull up a large quantity of it where it grows wild in abundance; and the ſeeds being ſhook out as ſoon as the plant is well dried, let him leave them about a week to harden on a floor; and then ſow them in ſuch a field, ſcattering them thick among the graſs.

I have had opportunities of making but very ſlight trials of theſe things; but ſo far as I have, they have ſucceeded. Four or five years ſince, I ſcattered a handful of the ſeeds of this plant, upon a piece of a poor hilly paſture, where the yellow ſand of the ſoil was ſeen among the thin blades of graſs, and in the very next year it covered that part; and has now overſpread the whole incloſure with an abundance of the moſt healthy food. Horſes, oxen, and ſheep, all feed upon it with great ſatisfaction, and we ſee the good effects in their condition.

CHAP. CXI.

Of water horſetail.

THE farmer is accuſtomed to conſider all the plants of the horſetail kind as incumbrances upon his land, and weeds of the worſt ſort. In general they are ſo, but the kind, properly called water horſetail, is an exception. It affords a large quantity of excellent food for cattle; and cows are remarkably fond of it, and their milk is encreaſed and improved by it. Let the farmer rightly know this from the others, that he may encourage its growth while he uſes his utmoſt endeavours to prevent theirs.

It is very tall and robuſt: the ſtalk is pale, hollow and jointed; and the leaves, if they may be called ſuch, are very long and of a freſh green. They grow round the ſtalk at the joints, like rays of a ſtar, and are very long and ſlender. It grows only in wet marſhy places.

By theſe characters the huſbandman will know the plant. We are not about to adviſe him to cultivate it; but to ſpare it where nature has chanced to throw it in his way. It will generally be found, without his care, in places that are fit for it; and will ſpread over them, and ſufficiently occupy them if he leaves it unmoleſted.

There is another kind with long leaves, which he ſhould deſtroy as carefully as he propagates this; it is called corn horſetail, but is not peculiar to corn fields. It is ſmaller and more branched than this; and when eaten by ewes with lamb, it occaſions their caſting them.

CHAP. CXII.

Of plants the farmer ſhould deſtroy.

WE have given a conſiderable detail of thoſe plants, which the huſbandman will find it proper to cultivate, tho' they are hitherto unknown in his profeſſion. We ſhall add here a liſt of plants which are hurtful to him, though he is not aware of it; and which it will be of uſe to him to deſtroy. The wild herbs of England are not ſufficiently underſtood, either with regard to their uſe or danger: we ſhall be happy, if ſo much concerning them may be turned to uſe as has come within our knowledge. Thoſe which are commonly known to be hurtful, we have ſpoken of in the preceding volumes. Theſe are ſuch as have before been overlooked or unſuſpected.

1. BUTTER-WORT: A ſmall herb which grows on bogs and marſhy grounds, with fatty leaves, and a flower not unlike a violet. This is a plant ſheep are fond of; but it is deſtructive to them. It throws them into the moſt dangerous purgings, attended often with feveriſhneſs; and ſometimes into the rot. It is not univerſal throughout the kingdom in thoſe kinds of ground; but the farmer ſhould every where be upon his guard againſt it, for a very ſmall quantity of it will do him a great deal of damage. He cannot miſs knowing it after the ſhort deſcription we have given; for it is one of the moſt ſingular plants in the world. The leaves are fatty, and often purpliſh. The ſtalks are naked, ſlender, and not above three inches high; and that the top of each is one flower with a ſpur behind. This is commonly blue; but the plant is ſometimes ſmaller than uſual, and the flower is reddiſh: This is as hurtful as the other.

2. Water-scorpion-grass. This is a very beautiful water weed; but as pernicious as the former. It grows always by the ſides of rivers, ponds, or ditches; and is never found elſewhere. It is about ten inches high: the leaves are oblong and of a pale green; the flowers are of a beautiful blue, and they ſtand in long ſpikes, which turn back at their ends, in the manner of a ſcorpion's tail when it is rolled up. The plant had its name from this. The flowers are ſo pretty, that the plant can never be overlooked; nor ſhould it even be ſuffered to grow where ſheep come. Theſe creatures ſeem to be leſs under the guidance of inſtinct than any other; they eat greedily of ſeveral plants which are very hurtful to them. This brings on deſperate diſorders: and, in the end, the rot; which is more difficult of cure when brought on by theſe plants, than any other way.

3. Longleav'd water-hemlock. There are ſeveral plants, of the name hemlock, of fatal qualities; but none more than this, though it has paſſed unſuſpected by ſome; and has even been ſpoken of as harmleſs, in regard to cattle by others. Theſe are the caſes in which the huſbandman muſt be moſt of all at a loſs; and nothing can be more uſeful than to ſet him right.

It is a tall and ſtately plant; the ſtalk is four or five foot high, and divided into many branches. The leaves are large and ſpreading; but they are cut and divided by threes into many parts, and their colour is a deep green. The flowers are white, and they ſtand in great round cluſters at the tops of the branches. The plant never grows any where but by the ſides of waters, principally near great ponds. The farmer will know it by this deſcription; and he ſhould deſtroy it whereſoever he finds it. Cattle, which have been always kept in the places where it grows, will not meddle with it; but thoſe brought in from other grounds, are often deſtroyed by it.

Wepfer, a celebrated author, wrote an entire treatiſe upon its poiſonous effects on our own ſpecies; and with great truth, for many have periſhed by eating its roots. But Rivinus, a writer of no leſs eſtabliſhed reputation, has aſſerted ſince, that oxen were very fond of the plant; and eat it without miſchief.

An accident has alſo taught us ſince that time, that the plant is as fatal to thoſe creatures, as to ourſelves. In the ſpring of the year 1744, a quantity of the roots of it were thrown upon the ſhore in ſome part of Sweden, where there were three oxen under the care of a keeper: they eat ravenouſly of the roots, and they all died. The keeper of the oxen gave an account of the accident, and of the occaſion. Some of the roots were ſent to the royal garden at Upſal; and being planted and well watered, this herb roſe from them. The fact is given, with all its circumſtances, by the celebrated profeſſor of the Upſal garden; and there can no longer be any doubt, but the plant is univerſally poiſonous.

4. LANCASHIRE ASPHODEL. The farmer is not to ſuppoſe that, becauſe this plant is named from a particular country, it is found no where elſe. We have it in marſhy places about London, and in many other parts of England; though as it rarely flowers in this part of the kingdom, and its leaves are like ſome of the flags, it is not often obſerved.

The root creeps under the ſurface: the leaves are long and moderately broad, and they are of a pale green colour. They very much reſemble thoſe of the common yellow water flag, but that they are not ſo large. This is uſually the whole appearance of the plant in this part of the kingdom. When it riſes to flower, the ſtalk is round, of a pale green, and in part covered with leaves of the ſame kind with thoſe from the root. They grow ſingly, one above another; the flowers ſtand in a looſe ſpike, and are of a fine yellow; they are ſweet ſcented, and they have a peculiar aſpect; for the filaments are woolly.

Wherever the farmer finds this plant, he ſhould deſtroy it. He may ſuſpect that it is in his paſtures when he finds his ſheep ſickly, and he cannot tell why; and he ſhould look for it in all marſhy places, and near the ſides of ponds: if he have it growing, the ſheep will be frequently feeding upon it; and the certain conſequence will be their falling into thoſe diſorders, which precede the rot; and finally into the rot itſelf.

5. HAIRY WOODGRASS. This is one of the moſt beautiful among the graſs kinds, and one of the moſt ſingular. Indeed, its flowers and ſeed veſſels ſhew it more properly to be of the ruſh kind; though the leaves are flat and graſſy. It is frequent in woods and thickets; and it ſometimes riſes unſuſpected among the graſs of hilly paſtures. We neither obſerve the plant nor know its danger; but the Swedes, who are more attentive, not only to the miſchiefs which happen to their flocks, but to what cauſes them,

have diſcovered this graſs, though it ſomewhat alters its form, in their paſtures; and have found that it brings on diſorders in their ſheep.

In the common ſtate wherein it is ſeen in woods, it grows to a foot and half high. The ſtalk is ſlender and jointed; the leaves are graſſy, but they are broad and hairy; and the ſeed veſſels, which are blackiſh, hang by ſlender footſtalks like threads.

In paſtures it grows to a leſs height, and the leaves are ſmooth: the ſeed veſſels alſo are purpliſh; but in all other reſpects, the plant is the ſame.

It is eaſily known when in flower, and even when not; the hairy leaves diſcover it in its more uſual places of growth. The farmer ſhould take the trouble of pulling it up wherever he ſees it; and he ſhould ſow better graſſes, or ſome of thoſe uſeful plants, we have named, in its place. This is the great precaution againſt its return, for it will not grow where there is plenty of other herbage.

6. Drop-wort. The name drop-wort is given to many plants, and very unhappily, to ſome that are poiſonous, and others which are innocent. The plant we mean, in this place, is that which the Latins call *filipendula*. The farmer will know it by this deſcription. The ſtalk is two foot high, and uſually reddiſh. The leaves are very elegantly divided into numerous ſmall parts, and are of a fine green; and the flowers, which are ſnow white, grow in great cluſters at the tops of the branches. The root is compoſed of a multitude of large knobs faſtened one to another by ſlender fibres; and they ſpread a great way under the ground.

This plant it is the intereſt of the farmer to deſtroy, whenſoever he meets with it in his ground, not that it is hurtful; but it will occaſion him much miſchief. The roots are the greateſt delicacy the hogs know; and thoſe creatures, who ſmell them at a conſiderable diſtance, even as they lie in the ground, will break through almoſt any fences to get at them, and will tear up the ground for a vaſt way to find them.

7. Clowns Allheal. This is a plant no other way hurtful than the preceding: but ſo much miſchief is done the ſame way to get at it, that a wiſe farmer will never ſuffer it in his grounds.

It is two foot high, and has ſomewhat of the appearance of the dead nettle kind, but the leaves are longer.

The ſtalk is ſquare, and ſomewhat hairy; the leaves ſtand in pairs, and they are notched at the edges, and of a duſky green: the flowers grow round the ſtalks at the joints, ſix at each joint; from the middle of the plant to the top: they are ſmall and red, with ſome mixture of white, not unlike the flowers of the hedge nettle. The roots are knobbed and fleſhy. The whole plant has a diſagreeable ſmell to us, but the ſenſes of various animals differ. Cats are raviſhed with valerian; and there are caterpillars which feed on ſpurge. The hogs are ſo fond of this root, that they will break any fence, except a wall, to get into the ground; and they will tear up a vaſt ſpace of the turf wherever it grows. For this reaſon it ſhould always be deſtroyed.

Its moſt natural place of growth is by the ſides of ponds and ditches; but where the adjoining fields are wet, it will ſpread all over them.

It would be wrong to mention the diſadvantages ariſing from this plant, without naming alſo its virtue: it is a balſamick, and healer of freſh wounds. Old Gerard tells, that a country fellow deſperately cut with a ſcythe, refuſed his aſſiſtance; telling him, he knew better than he did what would cure him. It was this plant he applied. Gerard acknowledges its virtue; and thence, and from the ſurly ſpeech by which he was led to the knowledge of it, he calls it *clowns allheal*, a name copied by all others.

8. WHITE WOOD-ANEMONE. This is a very early beauty in our paſtures, where there are woods and thickets near; but its elegance ſhould not plead againſt its deſtruction, for it is a very miſchievous plant.

It is properly an anemone, though a weed in England; and in gardens it becomes double, and makes a very agreeable appearance. The leaves are of a fine deep green, and they ſtand upon ſlender green or reddiſh footſtalks. Each is divided into three principal parts, and the ſmaller diviſions are alſo cut or jagged at the edges. The ſtalks which bear the flowers have three of theſe leaves of the ſame form and colour, and running up naked two inches above theſe, they bear each one large and elegant flower. This is naturally white, but it has often more or leſs of a very agreeable purple tinge. The ſeeds follow naked in a cluſter.

The natural place of growth of this plant is in woods; but it will ſometimes riſe under ſhady hedges, and the ſpreading roots will ſoon carry it from them into the fields themſelves, where it is eaten by cattle early in ſpring, to their great hurt, and often to their abſolute deſtruction.

The leaves of this plant appear in all their freſhneſs very early in ſpring, when little elſe is up beſide the graſs; and it is at this ſeaſon principally oxen and cows feed upon them: for when the flowers appear they will not touch them: whether it be that they then know the plant, or what is much more likely, that the leaves have no longer their freſh and juicy texture, the nouriſhment being ſent to the ſtalk.

The conſequence of cattle eating but a little of this, is their falling into a ſtrangury, or difficulty of urine; and if they eat more, they make bloody water, and often die. What is to be done in theſe caſes, we have ſaid at large in the preceding volumes, treating of the diſorders of cattle: but the beſt remedy is prevention. The farmer ſhould deſtroy the plant whereſoever he ſees it; and this is the eaſier, becauſe it ſeldom ſpreads all over the ground, but keeps in ſome one ſpot, where the roots may be dug up.

9. THE THICK POROUS MUSHROOM. This is a vaſt fungus; of the kind of thoſe we uſually call toad-ſtools, by way of diſtinction from the fine well-taſted kinds which come to our tables. It is a cuſtom to rank all thoſe as poiſonous, which are not pleaſant to the taſte, but that is idle and erroneous: there are many which are not pleaſant, and yet are wholſome; though there are ſome really and truly poiſonous. This of which we ſpeak in the preſent place, is a coarſe and very ill-favoured kind, but it is not unwholſome. The palates of cattle differ from ours; and we find that cows think this a very reliſhing morſel, but it hurts their milk, and the farmer ſhould for that reaſon deſtroy it; nor is any thing more eaſy, for it is very conſpicuous, and very eaſily diſtinguiſhed.

It is a large muſhroom, four inches and a half high, and four inches in meaſure over the head; the ſtalk is very thick and ſpungy. The head is broad and thick, and is of a dull yellowiſh brown on the upper ſide. Underneath it is of a greeniſh white; and it is not divided into galls, but of a fleſhy ſubſtance, and full of pores, or irregular holes.

It is common in woods and coppices, and ſometimes riſes under hedges in the paſture grounds. The cows think it a delicacy, and never fail to eat it whereſoever they find it, but it always gives a nauſeous taſte to their milk; and when the quantity is great, makes the cream ropy and thick. It is principally in Auguſt and September that it is found;

and the hedges where it is moſt likely to grow, are thoſe which have old trees in them; the farmer ſhould in theſe caſes ſend out a labourer for half an hour, early in a morning, with a hedge ſtake in his hand, to beat them down and deſtroy them. There is danger in letting them ſtand, not only becauſe of the cattle finding them, but becauſe they ripen their ſeeds in great abundance in the holes of the under part of the head, and theſe produce young plants abundantly.

The farmer is apt to find fault with many herbs as hurting his butter, which have nothing to do with it, particularly the marſh marygold, which no cow eats; but this unſuſpected muſhroom is really hurtful. I have known them very carefully ſend labourers, in the beginning of May, to tear up the water marygold in their meadows; from an opinion, that it was the flowers of this plant which gave a yellowneſs to the milk; but a very little obſervation would have taught them better, for cows never meddle with the plant. Wherever they leave it flowering, they will find it ſtand untouched till it decays.

It may not be amiſs to remind the good houſewife on this occaſion, that the plant is harmleſs, and that its large ſeeds for flowering before they open, being preſerved in vinegar in the manner of capers, make an excellent pickle, very like that, only better.

CHAP. CXIII.

Of motherwort.

THIS is an herb the farmer need ſeldom give himſelf the trouble to cultivate, for its natural place of growth is about his yard; but where he has it not naturally, he will do well to ſow a little. It is not a food for cattle, but a medicine.

The farmers of old time eſteemed it greatly, when their horned cattle had diſeaſes of the throat, the breaſt, or lungs; and there are recorded inſtances of many ages ſtanding, that it has done great cures even in the murrain. One inſtance we have received of later date, and upon very good authority. A farmer of Cornwal, ſuppoſing the diſeaſe which has been ſo fatal among the horned cattle was breaking out among his little ſtock, had recourſe to this herb, and drenched them all. He bruiſed a large quantity of the plant, and preſſing out the juice with a little ſtrong beer, gave half a pint for a doſe to every one of his cattle morning and evening. He ſeems certain that three of them had the firſt ſymptoms of the diſeaſe, when he undertook their preſervation by this means; and if he did not deceive himſelf in that particular, the power of this medicine muſt be very great, for not one of all his cattle died.

The wholeſome nature of the herb all phyſicians know; and it is plain they had a great opinion of its virtues, who gave it the Latin name, which is *cardiaca*, a medicine for the heart. It is certainly worth farther trial: nor is there any thing the huſbandman ought to ſeek ſo carefully, as a remedy for this deplorable diſeaſe.

Motherwort is a rough and ill-looking plant, of a yard high. The ſtalks are ſquare; the leaves are deeply jagged, and of a blackiſh green; and the flowers are ſmall and reddiſh: they are ſomewhat like the dead nettle flowers in ſhape, but ſmaller. It will grow on any waſte ground without culture; and if once ſown, will perpetuate itſelf for ever.

CHAP. CXIV.

Of the French management of lucern.

THE culture of lucern we have given in the preceding volumes; and the advantages of introducing it into the courſe of the huſbandman's buſineſs are ſo great, that none who has opportunity ſhould neglect it. Since the time of that publication, a method has been found of adding greatly not only to the annual produce, but to the continuance of this plant in the ground; and ſufficient trials have been made in England, to aſcertain the truth of the improvement.

The world owes the thought to that excellent naturaliſt Monſieur Du Hamel, who introduced the horſehoeing huſbandry into France, at a time when ourſelves neglected it, though propoſed by Mr. Tull in our own country, having ſeen from experience whatever its real merit, and what its defects has now reduced to an art of abſolute certainty: and having the happineſs and honour of that great ſanction, the protection of his ſovereign, he is daily adding wealth as well as knowledge to his country.

This gentleman obſerved, that lucern, when it had grown ſome years upon any piece of ground, grew weaker than at firſt, and its produce became gradually not only worſe, but leſs in quantity. Graſs grew upon the intermediate ground, and the proper crop appeared overgrown and too old for ſervice.

On opening the ground about ſeveral of the plants in ſearching the cauſe of this, he found the principal roots had penetrated through the whole coat of uſeful mould, and were lodged in a cold clay, or ſome other bed of earth, uſeleſs to vegetation.

This was a plain cauſe, and this he undertook to remedy in the following manner.

He ſowed lucern in the uſual way, and when the plants had got ſome height and ſtrength, he took them all up, and tranſplanted them, cutting off the principal roots which run downwards. This was introducing garden culture into the field, but for a crop which is to ſtand ſo long, it will be very well worth his while.

The beſt ſeaſon for this tranſplantation is autumn; and ſhowery weather ſhould be choſe for doing it. The ground, into which the plants are to be removed, ſhould be got quite ready for them; and then no more ſhould be taken up than can be very well managed in the new plantations, for the ſide fibres ſoon get dry, and are hurt by lying in the air; and it is on theſe the great dependance is placed for the ſucceeding crop. The long downright roots being cut away, the others are to be trimmed at the ends, and the plants reduced to a ſmall quantity at the head. This done, they are to be regularly planted at the diſtances we have before directed, treating of this plant. Every one knows ſhowers are needful upon this occaſion; and if nature does not ſend them, the labour of the hand muſt ſupply their place. No plant is better able to take care of itſelf than lucern, when it is once properly eſtabliſhed; but this is a peculiar time, and is indeed a proceſs of art, and therefore out of the way of nature: it muſt be ſupported as it was begun; and if no rains fall, the whole plantation muſt be well watered once, twice, or even three times, at one day's diſtance: more than this will never be neceſſary, often leſs; and as we have directed a ſhowery ſeaſon to be choſen, moſt probably nothing of it will be required; but nature will do all.

From this time the plants are to be treated in the ſame way as others, of the ſame kind and growth. We have given directions for this, and need not repeat them here.

The conſequence of this method of plantation is, that the principal downright roots being deſtroyed, the ſide fibres enlarge and encreaſe in number: they ſpread themſelves throughout that part of the ground, which affords the natural nouriſhment for plants, and conſequently the crop is well ſupplied; whereas, when the ſtrength of nature at the root was ſuffered to waſte itſelf in the downright ſhoot, fewer fibres were produced where the nouriſhment lay; and the root was ſent down to a part of the earth, where there was none. Thus the plant itſelf was ill ſupplied, and the whole ſpace of the ground, intended for giving it nouriſhment, was given to uſeleſs weeds. Graſs grew upon it, and that appeared to ſtarve the crop, while in reality the cauſe lay much deeper.

Reaſon declares plainly for this practice, and experience in France countenances it entirely. In England we are not without the ſame authority. A clergyman, who has an eſtate in Cornwall, and who is employing a great underſtanding in this noble and moſt worthy purſuit, the improvement of agriculture, aſſured me, that by this practice, he had raiſed a field of lucern, which was ſo ſtrong this preſent year, that, about the middle of July, when he was pleaſed to ſpeak with me about it, his people had cut three crops; and he made no queſtion of having two more very good ones during the courſe of the ſummer.

The farmer is often miſled by the romantick accounts of thoſe, who are deſirous to recommend particular practices; but we have told him he may depend on meeting TRUTH in this work. He will certainly ſee, that a plant, from which he may obtain five crops of hay in a ſummer, and which will ſerve him a great part of the reſt of the year for feeding, is worth his regard; and this method of improving it to the utmoſt value, is worth his trying.

The practice, though it has been applied by its inventor, only to the lucern, may be uſed with the ſame propriety to all the perennial deep-rooting plants; for they all loſe their great fertility, when they deſcend into a poor, cold, or uſeleſs ſtratum; and frequently, the decay of the crop is owing to this, when it is attributed to a very different cauſe. It may be uſeful to know this, if it were only to prevent the attempting a remedy by means that cannot ſucceed; but when we ſee it in the full light of the advantages of tranſplantation, it is worth all our care; for this way the miſchief may be entirely prevented, and it may be applicable, not only to many of the laſting crops now in uſe, but to ſuch alſo as may be introduced hereafter.

The ſyſtem of field and garden culture are, in reality, the ſame; for vegetation is managed upon the ſame principles, whether the extent of ground be leſs or greater; and gardeners know the uſe of this practice very well, both in regard to herbaceous plants, and trees. They frequently tranſplant the one kind for the ſake of cutting of the top roots, and they lay a tile at a ſmall diſtance under the ground, in planting the other, to make the roots ſpread at a ſmall depth, by preventing them from penetrating farther downwards. By all that I have ſeen in gardening and in farming, not only in the large way, but by experiments made purpoſely for that end, I think that the great advantage to plants in general is, the promoting a large ſpreading of ſide fibres from the root, and keeping theſe within a certain depth: for the earth, which is within the influence of the ſun, and is capable of being moiſtened by every ſhower, is the part which gives, and muſt give nouriſhment to plants. We have lately found, that half the trees, which miſcarry ſoon after planting, owe that accident to their being planted too deep: we ſee ſhallow ſoils, where the bottom is any thing but clay, ſucceed very happily for almoſt all crops; and we have a moſt remarkable inſtance in the culture of the vine, that the ſpreading of the roots within the influence of the ſun, is the great ſecret for ripening the fruit, and perfecting the juices.

All this conſidered together, gives a very ſtriking leſſon to the farmer, that by whatever means he can give this advantage to the crop, he ought to do it.

CHAP. CXV.

Of bees.

TO what we have publiſhed relating to bees, in the preceding volumes, and which we hope contains all that is uſeful in the common practice: we have now ſomething to add from the correſpondence of an ingenious clergyman in Suſſex, who has beſtowed a great deal of his leiſure upon the care of this uſeful inſect, and who, adding to the common advantages of obſervation and accuſtomed knowledge under this head, a very perfect claſſical learning, has endeavoured to improve the common practice of England and Holland, from that of the antient Italy; and has added to Virgil, Varro, and Columella, as well as to the moderns, a great deal from his own obſervation. I wiſh he had permitted us to publiſh his ſeveral letters in his own words; but ſince that is not allowed, we ſhall be careful to preſerve their meaning; and ſhall endeavour to render the inſtruction they convey plainer to the farmer, and in a ſhorter compaſs.

This gentleman's houſe is ſituated upon the edge of a vaſt heath: before it there is a large fertile ſpace of ground, well encloſed and cultivated. Behind he is ſheltered from the north by hills. Plantations, made a century ago, defend him from the eaſt; and even the heath, to which he is open to the ſouth weſt, is not without ſome ſhelter from ſtubbed oaks and brambles on the riſing hillocks.

Among the other amuſements of a retired life, the care of bees came early into this gentleman's thoughts; and he ſaw that his ſituation favoured them, becauſe it was warm and well ſheltered: but he found advantages in it, which exceeded expectation; and of which, at firſt, he could not gueſs the cauſe.

Virgil, from whom many of the other Romans copy their directions, adviſes the placing bees where they will be moſt quiet; and where the ſun has power. This gentleman choſe a ſituation, the warmeſt and moſt ſheltered of any about his houſe, and where the ſervants had leaſt occaſion to come. He took into his own hands, the two or three paſture grounds which lay contiguous to his houſe, and keeping them principally for hay, few cattle were put into them.

The creatures therefore had reſt and warmth; and he aſſiſted them with all the comforts uſually directed in books, or practiſed by thoſe who keep bees. He obſerved, that they throve better than thoſe of his neighbours, and upon examining into the reaſon, he ſoon diſcovered that it was owing to their having larger room to rove: thoſe bees, which belonged to a neighbour, whoſe houſe was near a publick road, and whoſe hives ſtood near his yard, he found ſcarce ever ventured farther than the garden, wherein the hives were placed: whereas, his went freely over all the fields, eſpecially when they were laid up for hay; and what ſurpriſed him very much, they took the heath into their circuit, and ſeemed no where happier.

The ſucceſs of his ſwarms, juſtified the doctrine of the antients on this head; and he ſoon found the means to encreaſe them yet more. It is a cuſtom to rub the hives with baum, an herb very agreeable to the bees. This gentleman found they were much fonder of another herb, the

CEDRONILLA. The reader will find a full account of it in our body of gardening, with a figure, and its culture. It is a ſpecies of dracocyphalus; and the vulgar gardeners call it, from ſome reſemblance in the ſmell to the balſam of Gilead, the balm of Gilead plant. The hives of the bees were rubbed often with this; and half a dozen flouriſhing plants of it were ſet round about the hives, and kept well watered. This had a great effect. The bees were always lively and chearful, and they ſoon became ſo numerous, as to form ſwarm after ſwarm, and require new habitations.

It often happens that late ſwarms are uſeleſs; but no ſuch accident happened to this gentleman.

They found food in plenty, whatever were their numbers; and as they ſtood warm, they would venture out in ſearch of it oftener than others would in ſuſpicious weather.

The quantity of honey from theſe bees was greatly ſuperior to the uſual proportion, but there was a particularity in the colour: it had a pale reddiſh caſt, but no other flavour than the honey of other people.

The proprietor of the hives had often wondered at the frequent viſits his bees made to the heath, but he began now to ſuſpect the cauſe.

He obſerved, that they were very fond of the flowers of the plant called HEATH, which grows in abundance on the grounds of the ſame name; and as the colour of that flower is red, he began to ſuſpect this gave the tinge to the honey. The obſervations and enquiries he made in the ſucceeding ſeaſons, gave him full proof of this. He found that all thoſe who kept bees near the heath, had more or leſs of reddiſh tinge in their honey. In ſome who lay very near, but with a road between, the honey had little of that caſt, becauſe the bees would not venture among the cattle and the paſſengers; in others who had the paſſage free, it was more: and he found one farmer, whoſe little garden terminated at the heath, and whoſe houſe had its front upon the road, whoſe honey was ſo red, that none choſe to buy it.

But with this there came alſo another diſcovery of more conſequence, the redder the honey was, the greater was the quantity of it; and as this tinge does no real hurt to the honey, it is certainly of conſequence that the quantity is ſo much encreaſed. The obſervation is certain, that bees will feed with great pleaſure upon the flowers of heath; that they get a great quantity of honey from them, and that the honey is as good as any other, the colour of it being ſomewhat particular. This ſhould teach all who live on the borders of heaths, to keep abundance of bees: for they will be ſupported in ſuch places with leſs expence and trouble than elſewhere, and they will produce a much larger profit.

The nearer a ſtand of bees is to a kitchen garden the better, not only for the health of the bees, but the flavour of the honey. The warmer parts of Europe abound with the fragrant and aromatick herbs wild; and it is for that reaſon the honey of thoſe places is ſuperior to that of England. The only chance we have of giving ours the ſame quality, is by planting ſuch herbs near the hives. In a kitchen garden they are raiſed for the ſervice of the table, and the bees will have their ſhare of them. Thyme and ſavoury, hyſſop, and ſweet marjoram, all give this fine flavour to the honey; and the greater the abundance of them, the better it will be.

This gentleman obſerved, that the bees were very fond of borage; and he ſowed a large ſemicircular bed of it at a ſmall diſtance from the hives. This agrees with the direction we have given in a preceding chapter, for raiſing the plant vipers bugloſs for the ſame purpoſe; for this is not very unlike borage in its nature. Indeed I have obſerved, that all the aſperi foliate plants, properly ſo called, ſuch as bugloſs, ſage of Jeruſalem, and the like, are very much ſought after by bees; and many of the ſtellate kind, as the white lady's bedſtraw, and ſuch others.

CHAP. CXVI.

Of the uſe of the ſaffrons plant for bees.

THE antients give us one direction which we have not followed, and which I am particularly ſurprized ſhould eſcape this gentleman; it is the planting ſaffron near the places where bees are kept. I have obſerved the common garden crocus, which are true kinds of ſaffron, are always greatly frequented by the bees during their ſhort times of flowering; and it is not a wonder, for we find their wine parts, which in all flowers are the peculiar organs that furniſh the honey, are very rich and moiſt. The antients ſay, the ſaffron gave not only a fine aromatick flavour to the honey of bees, which were kept near where it was planted, but alſo heightened its natural yellowiſh hue to the colour of pure gold. Columella recommends the Corycian and Sicilian ſaffron for this purpoſe; but our farmer may be told, there is none equal to that of England.

The common ſaffron may be very eaſily propagated in gardens for this purpoſe; and its flower is as beautiful as any of the common crocus we plant for ſhew. But much more than this may be done for this purpoſe. We have brought the art of gardening to ſo much perfection now, that we can continue a ſhew of flowers, in the plants of the bulbous kind, much longer than their natural time. This is to be done by planting ſome parcels of roots later in the ground; and by this art, with the aſſiſtance nature gives of the variety of ſpring crocus and autumnal ones, we may have a blow of theſe flowers, for the ſervice of the bees, nearly all the ſummer.

Beſide the firſt mentioned uſe of giving, by this means, a peculiar colour and flavour to the common honey, this plantation will very well anſwer the purpoſe of thoſe, whoſe honey ſuffers in colour, from their hiving in the neighbourhoods of heaths: the bees, by having a quantity of crocuſſes juſt before them, will be kept, in ſome meaſure, from the flowers of the heath; and the yellow from theſe plants will take off the redneſs which ariſes from the other.

A farther direction may be given on this head, which will be of great advantage. The farmer, who lives in a ſaffron country, ſhould always keep bees; they will be particularly ſtrong and healthy from the advantage they receive from this plant; they will ſwarm oftener and in larger number than others; and not only the quantity of honey will be great, but the quality excellent.

There is more difference in honey, occaſioned by this article of the plants in the neighbourhood of the hives, than many think. The gentleman, to whom we are obliged for the remarks, whereon theſe additions to that article are founded, aſſures us, he can diſcover by the taſte of the honey, what plants principally grow in the neighbourhood of the place where it was made. The farmer, who plants ſaffron, ſhould always place a number of hives in that part of his garden which is neareſt the ſaffron field, or from whence the bees can make their way the moſt eaſily to it. Or if others in his neighbourhood have ſaffron fields, tho' not himſelf, he ſhould never fail to take the ſame advantage. It gives him a conſiderable benefit without any hurt to the proprietor. The bees will give no diſturbance to the people employed to gather the ſaffron, for they only work in the fields certain hours; and thoſe creatures will not come into it at that time, becauſe they hate a diſturbance; they take their flights only when the gatherers have left the field, and they enrich their combs without hurting the ſaffron.

CHAP. CXVII.

Of other herbs which give a flavour to honey.

AMONG the flowers bees love moſt, come thoſe of the *bean*, but they are leaſt uſeful to them. The quantity of honey they obtain from theſe, appears, on nice examination, to be leſs than from many other flowers; and tho' the bean flower itſelf be very ſweet, it gives a kind of faintneſs to the honey. Nothing but repeated and accurate trials, by taſting the honey made at certain ſeaſons, can determine this point of the effect of various flowers upon it; but thoſe trials are worth making; and the effect is eaſily known. This has been fairly tried by our correſpondents, and he has found, that the honey they collect from theſe favourite bloſſoms, is pale, whitiſh, mealy and ſickly to the taſte.

On the contrary, where there are turnips and cabbages which ſtand for ſeed, the bees are fond of their flowers, and though one would think theſe a very unpromiſing kind, they encreaſe and improve the honey. There is no purer honey than is collected from theſe flowers; its colour is a pale yellow, and the taſte is a perfect ſimple ſweetneſs. The firſt obſervation our correſpondent made on this, was on the honey of ſome bees which ſtood near a field of corn which had been ill managed, and was over run with *charlock*, a plant of the ſame claſs. He obſerved the bees were particularly fond of the flowers of this plant, and he had the curioſity to deſire to taſte the honey. This gave the firſt intimation of the effect of that plant, which more particular obſervations afterwards confirmed.

Mathiolus, who has collected carefully from the antients on this head, mentions, with wonder, the fondneſs bees ſhew for the muſtard plant: Virgil and Columella overlooked this among the favourites of the bee, but obſervation proves it to be true; and upon the principle juſt laid down, there is nothing ſtrange in it, for the muſtard is of the ſame kind with charlock, turneps and cabbage, though different in the peculiar ſharpneſs of the ſeed: the flowers are formed alike, and they are of the ſame claſs of plants.

Violets are a flower very agreeable to bees, for the time they laſt; but let the farmer obſerve, that the common ſingle violet, ſuch as grows in hedges, is the proper kind; for the double violets, uſually planted in gardens for ornament, while they invite the bees by their ſmell, only tantalize them, for they contain no honey. There is a very peculiar ſweetneſs in the honey collected in this early ſeaſon, at a place where the violets, whether wild or planted, are abundant.

In all theſe accounts of the effect of various plants on honey, the reader is to expect only moderate changes, and theſe, according to the circumſtances, greater or leſſer in degree. The honey never ſhews the full effect of any flower, becauſe the bees never feed from any one kind alone; but from the garden plants in full flower, and which they are ſeen moſt attached to, ſome fair concluſion may be always made, that the honey of that time, though not collected entirely from theſe, yet is in great part owing to them.

There are alſo ſeaſons when bees go leſs out than uſual, or to a leſs diſtance. Theſe ſhew the effect of certain plants more clearly, if there happen ten days or a fortnight of tempeſtuous weather, at a time when a parcel of feeding turneps are in flower in the ſame garden where the hive is, the bees will content themſelves with what they can get from theſe, becauſe it is diſagreeable to them to go farther, and, in that caſe, the new made honey will, in a manner, be all made from that flower. Theſe, and the like accidents, in the courſe of a life devoted to contemplation, have given opportunities of knowing the effect of particular flowers on the products of the bees, which have perhaps fallen in the way of few others.

Roſes are a favourite flower of bees; but it is only under certain circumſtances they pay ſo much regard to them. It is not honey, but wax they collect from this flower; and if they do not want wax, they ſlight it.

The red roſe is the kind they moſt affect; and the leſs double it is, the better they like it. The reaſon is plain from what we have explained before, relating to the nature of wax. The yellow buttons, on the threads of flowers, are the parts wherein it is originally formed by nature, and from whence bees collect it. Theſe are very numerous in the roſe, therefore the bees love that flower; but the more double the flower is, the leſs wax there can be in it, for the leaves, which make this fulneſs, are formed out of the threads and theſe yellow buttons; ſo that the fuller or doubler the flower is, the fewer of theſe buttons there are, and the leſs temptation the bees have to meddle with it. When a roſe is perfectly double, there are none of theſe threads or yellow buttons left in it; and the bee no longer regards it at all. This diſcovery, that the doubleneſs of flowers is formed in this manner, is new, but it is certain, and in many inſtances, particularly in the hollyhock and in the double tulip, the button may be yet ſeen upon the new leaves, ſhewing their origin. While theſe buttons remain in any ſtate in the flower, the bees will come to it for this purpoſe; but they are fondeſt of it in perfect ſingleneſs, which is the ſtate of nature, and in which the wax is found in it in the greateſt perfection.

The common broom is another plant, from whoſe flowers the bees collect a great quantity of honey. This is ſuffered, by a ſtrange neglect, to over-run whole tracts of hilly ground in ſome parts of the kingdom; and broomfields is a term by which the people expreſs ſuch land. Though they are very negligent who ſuffer ground to be thus over-rún, the farmer ſhould take the advantage of it for his bees. If he live near ſuch a field, let him immediately ſet up a ſtand of hives in that part of his garden, from whence they can get at the broomfield with leaſt trouble; where the courſe is ſhorteſt, and the way liable to leaſt diſturbance. His bees will ſoon find the way to it, and he will reap the benefit, in a great quantity of very fine honey, and an extreamly thriving ſtock.

In the year 1752, our correſpondent being on a journey thro' a great part of Kent, examined, in his curious way, the honey of ſeveral places where he had opportunities; and particularly that of two or three farmers, who had this peculiar advantage for their bees, of a broomfield in the neighbourhood. He found the honey very good in all theſe places; but much of the nature of that collected from turnep flowers that is pure and excellent, but with no peculiar flavour.

In one farmer's houſe he found a honey thinner than the reſt, but not ſubject to candy; the colour a clear and fine yellowiſh, but the taſte highly aromatick. Thoſe who have been accuſtomed to the taſte of the true foreign capillaire, will know what we mean by this; that ſyrup has it in perfection, and it is owing entirely to the honey, for the maiden hair, which is the only ingredient beſide, has no ſuch flavour. This taſte in the foreign honey, we know, is owing to the aromatick herbs, which are ſo abundant in thoſe countries: our correſpondent knew the broom flowers could not give it in this inſtance, and he examined the field to find ſome other cauſe. The ground was over-run with anthills; and there was in it an old gravel pit, long covered with weeds. All over theſe anthills, and upon the ſides of the old pit, there grew a vaſt quantity of wild thyme, the moſt fragrant of all the Engliſh aromaticks; from this the bees had collected enough to give fragrance to the abundance of pure honey they gathered from the flowers of the broom.

This appeared to our correſpondent the very fineſt honey he had met with in England, and we may rely upon his judgment. Therefore, wherever there is an opportunity of a broom field with wild thyme, it will be worth while, even at ſome expence, to fix a ſtand of bees.

From the honey of theſe hives a CAPILLAIRE may be made of equal virtues, and equally pleaſant with that of Montpelier, and we may ſave the money, that goes out of the kingdom annually, for this frivolous article.

The only ingredient beſide is maiden hair; and our black maiden hair, which is common on old walls and under ſhady hedges in many parts of the kingdom, will anſwer the purpoſe of this very well.

Let the perſon, who ſhall attempt to make this ſyrup in England, get the right herb and uſe this fragrant honey, and he will not fail. He muſt not buy the plant at the herb ſhops, for they uſually ſell a common kind of fern in its place, which is nauſeous and has no virtue.

CHAP. CXVIII.

Of plants hurtful to bees.

ARISTOMACHUS, who ſpent ſeventy two years of his long life in obſerving the Œconomy of bees, does not ſeem to have underſtood them ſo well as the gentleman, to whom we owe theſe obſervations; nor has any one ſtudied them with ſo much regard to uſe. After examining by theſe moſt certain experiments, what thoſe plants were which bees moſt loved, and what effect they took upon the honey; be beſtowed his attention upon thoſe kinds which were diſagreeable to them, and hurt them.

We have a weed called STINKING ORACH, ATRIPLEX OLIDA, an excellent medicine, but a very offenſive herb to bees. Unluckily it is common in farm yards and neglected gardens. Bees hate all ſtinks, and they ſeem in a particular manner to deteſt this.

Our correſpondent obſerved in a cow-keeper's garden near London, in 1748, a great quantity of this plant growing all about the beehives, and under the very ſtand. The man complained that his bees were always thin in the ſwarm, and produced little honey. He was adviſed to deſtroy all this weed, and digging up the ground, and throwing in ſome mould to plant baum and hyſſop, and winter ſavory in the place. He did ſo, and writing the gentleman, who gave him the advice, a letter of thanks, three years after, he ſaid his bees had throve excellently upon this change, and continued in the ſame ſtate ever ſince.

Elder ſhould never be planted near where there are bees. The flowers feed many inſects, but they are hurtful to theſe. There is a conſiderable quantity of wax to be collected from them; and ſometimes in diſtreſs, bees will ſeek it there, but their honey always get a ſickly flavour by it; and the bees themſelves become unhealthy.

The common ſingle narciſſus or daffadil, is another plant that does harm to bees. They get an ill-taſted honey from the bottom of this flower, but it does them nothing but harm: they grow faint and languid after it, and in places where this flower is very plentiful, the honey is greatly debaſed by it; becoming thick, and of a heavy and vapid flavour.

It is ſtrange, that experience here contradicts the doctrine of the antients, who, in general, have underſtood bees very well; they direct the narciſſus to be one of the plants cultivated near the hives: but there are many kinds of narciſſus; and it is not improbable they meant the white kind with the purple circle, which we call the poetick daffodil. What effect this may have we don't pretend to ſay, having only obſerved the yellow kind.

Among ſhrubs, there is only one in our hedges which is yet known to be very hurtful: this is the DOGBERRY HASLE, called by the Latin writers, CORPUS FÆMINA. The flowers of this throw the bees into incurable diſorders. They are tempted, on certain occaſions, to uſe them freely, and great numbers periſh.

In general, nature has very well taught this little creature what to ſeek and what to avoid; but the greateſt danger to which it can be expoſed, is that of being near a garden of foreign plants. Many of thoſe, our curious people raiſe, are poiſonous. I once ſaw a remarkable inſtance of a great number of bees being deſtroyed by a peculiar kind of apocynum, or dogs bane. This kills flies while they play about its flowers; and a gentleman having raiſed ſome of it not far from the place where his hives ſtood, the bees were fond of the flowers, and periſhed by their poiſon ſo ſuddenly, that multitudes of dead ones were found continually upon the ground, round about the plants.

There are many other herbs raiſed for curioſity, which are of the ſame poiſonous nature, and bees are much more in danger from them, than from any which are the produce of our own country: whether the inſtinct, which directs them, be limited to the plants of our own growth, or howſoever it is, we find not only theſe ſmall animals, but larger creatures alſo in much more danger from thoſe herbs, which the art of man has introduced into the countries where they live, and feed them from all that are brought into their way by nature.

It is ſaid, honey is ſometimes rendered poiſonous by the bees having fed on poiſonous flowers, but we meet with no certain inſtance to confirm it; nor is the thing likely, ſince we find the bees themſelves are affected by plants of this kind themſelves, and would, after feeding on poiſons, dye before they could diſcharge their honey into the cells of the comb. This ſeems one of the raſh aſſertions of thoſe men who place their imagination in the ſtead of obſervation; and repeat as facts, what their fancy has ſuggeſted; although it be what their mature reaſon would contradict.

It is an obſervation of Columella, that the elm is hurtful to bees. The flowers of this tree appear early in ſpring; and they are ſmall and inconſiderable, they grow alſo on the tops of the trees, and therefore we ſcarce obſerve them, except when they are fallen off, in which ſtate we find them ſcattered on the ground about the ſtems of the trees.

Our correſpondent, who has been ſo curious on other heads in regard to the bee, did not omit his obſervations upon this: but whether the effect of climate, or whatever elſe, makes the difference between the bees of England

and thoſe of Italy, it is evident, that here theſe flowers take no ill effect upon them. They afford a conſiderable quantity of honey, at a time when theſe little creatures are in extream want of it; and therefore our bees feed greedily upon them; but without hurt, either to themſelves or their ſtock.

Two or three of the early flowering ſhrubs are violently purgative, as the mezereon of our gardens, and the Laureola or ſpurge laurel of our woods, of which we have given an account at the latter end of the third volume, treating of hurtful plants. The flowers of theſe ſhrubs invite the bees which have had none for ſo long a time; and they are killed by them in great numbers. To prevent this, our correſpondent has found an excellent medicine. He obſerves, that the drug called Japan earth, is a remedy for the ill effects of theſe ſpring flowers; and that its taſte being ſweet, the bees feed on it very readily when boiled up in water and mixed with honey. Columella names the ſpring ſpurge at the ſame time as the elm; and attributes the diſorders of the bees, at this ſeaſon, to one as well as the other: probably it is this laureola he means, and that is a plant more likely to occaſion the effect than the other. Whichever it be, or from whatever herb, this is a remedy. Certainly, where mezereon is common, the bees in ſpring periſh by it, as if they were poiſoned.

CHAP. CXIX.

Of a new uſe of human excrement.

ACCIDENT, the parent of the greateſt part of our uſeful knowledge, has diſcovered a new uſe in the manure from human excrements, of which we have ſpoken in general in the preceding volumes. There is ſomething in the higheſt degree diſguſtful in the thought of uſing this manure for any thing that is to be taken again into the body. But any uſe is better than for bread; and it is particular, that in the preſent inſtance, though uſed for fruit, it gives no ill flavour in the leaſt to them.

One would be led to think from this, that the abſolute taſte of manure cannot affect the product of trees, though we perfectly well know it can affect that of herbaceous plants; and that, although cabbages, and the like products of the kitchen garden, are rendered more or leſs offenſive, according to the quantity of horſe dung that is uſed in the ground, yet in the larger growths with woody ſtalks, no taſte or flavour is received from the ingredient. This would lead us to a plain uſe of the moſt offenſive manures, in caſes where they would be highly proper; and the quantity of human excrement, in particular, that is made in London, affords a reaſon for trying it thoroughly.

The incident which gave occaſion to theſe obſervations, is the following. It comes aſcertained by unqueſtionable authority.

A chymiſt in London, who made the famous preparation Phosphorus, found, by long experience, that a mixture of human urine and excrements, anſwered much better than urine alone; of which it had been uſually made. Theſe ingredients were to putrify together before they were fit for the purpoſe, and a very large quantity of them yielding but a little of the phoſphorus, the ſtench in the ſtreets of London was unſufferable. This gentleman was obliged therefore to take a ſmall houſe juſt out of town, in the fields toward Marybone, which had a little garden encloſed within a high old wall. This anſwered his purpoſe: for the ſtench of his ingredients was not unlike that of the neighbouring dunghills, and the practice was altogether unſuſpected.

The garden being of no uſe, went to decay: but ſome fruit trees remained, particularly one antient pear tree. Neglect had robbed this long of its fertility, and it was overgrown with moſs. To the trunk of this tree was faſtened a kind of circular ſhed, under which the human excrements and urine were ſet to putrefy. The buſineſs ſucceeded very well, and a ſurpriſing change appeared in the old tree. It had for many years been barren, but it now became fertile beyond all thought. The fruit was more than could well be ſupported by the branches, and was fairer to the eye, and finer to the taſte than the generality of pears of that kind. The taſte was a point ſo much ſuſpected, that the proprietor would not take his own judgment, nor that of the people in the ſhop, but brought them to table among his friends and acquaintance: all approved them particularly; and at length, one of the beſt of our gardeners happening to dine with him, was ſo taken with the improvement of that pear, which he called by its name, but ſaid it was finer than he had ever known it: he begged the ſecret, which I ſuppoſe he has practiſed with ſucceſs ſince, though he has not been ſo generous to the world as the chemiſt was to him in diſcloſing it.

The practice, in ſome degree, confirms the doctrines of the antient agriculture. The Romans have ſpoke of human excrements as the richeſt of all dung; and naturally indeed it muſt be ſo, ſince they are produced from the richeſt foods: but they had not at firſt the art of uſing it, and they found it too hot: they complain that it burnt up the ground. Varro and Columella agree, that urine of our own ſpecies, after it has been kept half a year to ferment, is excellent for fruit trees. They are particular in recommending it for the pomiferous trees, and for vines, and they boaſt of the particular fine flavour of the fruit and of the vine, raiſed from this dreſſing.

What they ſpeak of the urine alone, we ſee holds true of that and the excrement together; and perhaps he, who ſhall find the way of uſing theſe beſt, will make a greater improvement, than any of late ages have done, in the uſeful arts.

It appears by experiments, that human excrements are of the nature of thoſe manures, which will bear a great deal of addition: for that fermenting ſlowly, they communicate that fermentation without damage to a great quantity of matter. The old Romans adviſe mixing with it the refuſe and ſweepings of the yard; and lately we have received accounts of its being tried with ſucceſs, with a great qnantity of the dirt of highways; and with calcined clay.

This laſt mixture will probably be the beſt of all for fruit trees; and in extream caſes, it may be proper to let the matter take its fermentation at the root of the tree, as was the caſe in this accidental trial. When the tree is not ſo far gone, the beſt way will be to uncover the roots, and lay in ſome of the mixture, and afterwards to cover it up again with two inches of mould. On this occaſion, it will be proper to remind the farmer, how far the roots of fruit trees, as well as others, run in the ground; and that he may apply this kind of dreſſing for any old tree, at the diſtance of five and twenty foot every way from the ſtem, with great propriety.

It often happens, there is an old orchard belonging to the farm, which produces very little, and which he cannot turn to any other uſe; this will be an excellent opportunity for the uſe of human excrements. Let him mix up a large quantity of theſe with the refuſe of the yard; and with ſome road dirt, and give a plentiful dreſſing to all the trees. If, at the ſame time, he will cut off a few of the worſt boughs, ſo as to contrive that the ſun and air may have free paſſage among the reſt; he will at once reſtore the ground from bearing little or nothing, to an excellent condition; and will have, not only plenty of fruit, but thoſe excellent in their kind.

CHAP. CXX.

Of blood.

FRUIT trees have been lately found, by careful obſervation, to be extreamly enriched by blood. In London, the butchers find purchaſers for blood of cattle when they have it in great quantity: and when leſs, it is often waſted. In the country, butchers have found its uſe for their fruit trees, and in ſeveral places in Suſſex, they bury it about the roots in orchards, and in the borders wherein their wall trees ſtand.

It is an obſervation of the excellent writer Evelyn, that not only blood of animals, but their fleſh, is an excellent and rich manure for all kinds of growths. He relates, from indiſputable teſtimony, one great inſtance, though a very horrible one, of this truth. A battle was fought in Badnam fields in Devonſhire, not more remarkable for the victory gained by the earl of Hopton, than for the obſtinacy of the diſpute on the ſide of the vanquiſhed: the blood that was ſhed, was perhaps more than from any inſtance of equal numbers; and the fields which received it, were, for the ſucceeding years, rendered fertile, in a degree not known before. The fact is certain, and the reaſoning is not ſtrange; for we know the blood of all animals promotes vegetation.

From this, and from what we have read and ſeen, concerning the effects of putrefying fleſh, the farmer may learn a uſeful leſſon. There will always be, in great towns, a large quantity of animal refuſe; and in ſmaller a proportion: even in his own family ſome. Let him know its value He may have it at a very moderate price; and when he has no immediate opportunity to uſe it on his land, he may mix it up in his dunghills; or even make it up into dunghills only with earth and weeds. The power it has of fermentation with mould, will convert the whole into manure, and that of the richeſt kind. That the fleſh of animals has the ſame effect with the human excrements, though perhaps in a ſomewhat leſs degree, we have lately ſeen in an inſtance at Richmond; where a dead dog, a favourite maſtiff, being buried at the foot of a ſtandard apricot tree, which had been accuſtomed to bear but little, the produce afterwards encreaſed vaſtly. The family were not fond of eating the fruit, becauſe they knew the cauſe; but their delicacy extending no farther than to themſelves, they gave it in large quantities among their friends and acquaintance, and it was univerſally admired.

CHAP. CXXI.

Of the damage of liming feeding grounds improperly.

THE improvement by lime upon corn land, early in the time of its general uſe, led people to lay it alſo on paſture ground; and the improvement that followed was certain, but often there came with it an unſeen damage. The cattle, which feed on ſuch grounds, fall into diſorders. The quantity of graſs is much greater after this dreſſing, and even the quantity of the nouriſhment in every blade. Horſes, oxen, and ſheep, are equally fond of it; and it does harm to all, but moſt to ſheep; which it always throws into ſome diſorder, and if the ſeaſon prove wet afterwards, they generally get the rot.

The farmer is not, for this reaſon, to give up ſo excellent manure; all he is to do is to uſe it with diſcretion. Inſtead of throwing on forty or fifty buſhels to an acre, let him content himſelf with about five and twenty, and let this be thrown on at ſuch a time, that its greateſt effect will be upon the crop for hay; not that for feeding. Thus, let a piece of paſture ground, that is intended for liming, be eaten down ſooner than the others, and the lime then thrown on toward the end of winter. Let the ſpring feeding be given up, for it is trifling in itſelf; and let the land be ſhut up from the time of the lime being thrown on. Let the charge of a labourer be added to follow the cart, that he may ſpread it very carefully; and leave the reſt to the rains and ſeaſons. The whole firſt ſtrength of the lime will thus go into the ſhoot for hay, and the crop will be vaſtly richer for it, and will be ready to cut earlier than others. If only the quantity of lime, we have directed, be uſed, let the cattle be turned in after the hay is off the ground; but if, according to the cuſtom of the lime countries,

tries, the uſual large proportion have been thrown on, then let the land be kept up for a ſecond crop; which will probably be a very plentiful one; and after this the cattle may be put in without fear.

Stone lime is beſt for corn grounds; but for paſturage that is moſt profitable, which is made of the ſofteſt materials. Lime made of chalk is better than that of ſtone; but the beſt of all is that which may be made from ſome of the light chalky marles. Of late ſhell lime has been made in great abundance; and from this much good has come to graſs grounds, the refuſe having been uſed for this purpoſe.

We have before ſpoke of the uſe of lime water for paſture grounds; and perhaps experience will at length reduce the practice to this, that when theſe ſoft materials are burnt into lime, the ſtone itſelf, if it may be ſo called, ſhould be uſed for graſs grounds; but when ſtone lime, that is, ſuch as is burnt from hard ſtones, is uſed, the beſt way will be to apply it in the water.

What we have lately ſeen in the graſs part of a very elegant garden near town, confirms this. The gardener was adviſed to ſprinkle lime water to kill the worms, which ſpoiled the graſs plats; and it took that effect very well: but there was alſo a great good, which he did not expect. The quantity of graſs became much greater; ſo that all the thin ſpots and bare places were rendered as green and velvety as the reſt; and the ſtrength at the root was ſo great, that in a ſucceeding drought of more than five weeks, which happened in the beginning of this ſummer, and which ſpoiled all the graſs walks in the neighbourhood, the graſs of this garden held a fine freſh verdure. This is a plain and certain fact: the effect could be owing to no other cauſe; and it teaches the gardener an excellent art.

CHAP. CXXII.

Of harrowing.

A Farmer in Buckinghamſhire complained among his neighbours that his crops did not ſucceed, though he ſpared none of the uſual expence; and particularly, that his harrowing was never done well, though his land was of the ſame nature with theirs, and he harrowed it no leſs than they did. What they could not amend, nor explain to him, was in itſelf very eaſy to be ſeen. The effect of harrowing is the tearing to pieces the clods of earth, and this requires that the harrow be drawn roughly and haſtily over the ground; for if it be dragged ſlow and gently, thoſe clods will turn out of the way of the tines, that would otherwiſe have been torn to pieces by them, and the whole operation may be performed without any effect.

This farmer had two very old and very poor horſes, lame and blind both; which he kept on little, and that bad food, and uſed only for the meaneſt purpoſes.

Theſe were the horſes he employed in harrowing, and being weak from infirmities, and weaker yet from their poor feeding; and under the guidance of a lazy driver, they crawled over the ground, and drew the harrow ſo very ſoftly after them, that it either roſe over, or run between all the clods it was intended to have broke.

We have ſhewn of how much importance harrowing is in our preceding volumes; and the gardener would be as wiſe who ſhould pretend to exclude raking from the ground, as he who ſhould ſet aſide the harrow for the farm: to perform its buſineſs ſo ineffectually, is the ſame thing with ſetting it aſide; at leaſt, it is in effect the ſame, and he who chuſes to omit it entirely, will perhaps fare better, becauſe he will take more care in the other operations.

It is a very juſt obſervation of that univerſal collector, Mr. Liſle, that when oxen are uſed for harrowing in hard lands, they do little or no ſervice, becauſe they go ſo ſlowly. The farmer will learn, by theſe miſconducts of others, to uſe the right kind of cattle, and to manage them in the proper manner, in this needful operation. The briſker they are, under the conduct of a good driver, the better the work will be done.

The ſtiffer the land, the more eſſential is the care in this article; for in the fine grounds, and thoſe of the adjacent country, which have a ſoft, black, mellow ſoil, the ſloweſt and ſlighteſt harrowing anſwers the purpoſe.

On the contrary, in clays juſt reduced to tillage, or in the very ſtiff loams, a great deal depends upon the harrow, not only for burying and covering the ſeed, but for the abſolute affair of tillage: ſuch ground is always getting towards its old ſtate of heavineſs and hardneſs again; and the harrow is the great inſtrument on which the rendering it fine depends.

A great deal depends alſo upon the flat poſition of the harrow on the ground, but this is not enough regarded: on the contrary, I have ſeen a driver, for the ſake of eaſing the draught to the cattle, ſet the harrow purpoſely ſlanting upwards, as coachmen throw the coach forward, to eaſe their horſes. The conſequence of eaſing the cattle is certain, but that is a trifle; the buſineſs is ill performed: for the harrow being raiſed in its forepart over the level, the reſt eaſily follow the ſame courſe, and the clods that ſhould be broke are at moſt only puſhed out of the way.

It is an excellent practice they have upon their ſtiff lands in Northamptonſhire, of going with three harrows at once: the third harrow, in this caſe, certainly keeps down the other two; and it takes whatever they happen to miſs.

The courſe in which the harrow is drawn, is an article of no ſmall conſequence toward the perfecting that operation. In going directly acroſs, it often happens, that where the land is very ſtiff, the harrow turns the furrows back again. In this caſe, the harrows ſhould be drawn aſlant, and in that direction they will never fail to do their buſineſs. They follow the cattle heavily in this way; but they will certainly perform their office: for the clods lying croſswiſe of them, may be turned away, inſtead of being broken, but when it is thus drawn aſlant, if a clod be ſo tough that it eſcapes one of the tines, it is thrown in a different direction before another, and is thus certain to be torn to pieces by one or other of them.

As much as poſſible, let the farmer avoid harrowing in very wet weather; for though the work may ſeem well done, there may be a great deal of miſchief. The horſes feet may have trod a great deal of the lower part of the ground into cakes, though the ſurface appear fine and well wrought.

In ill-managed harrowings, or unlucky conditions of the ground, it will ſometimes happen, that the repetition of this work throws up a part of the ſeed. In this caſe the moſt adviſeable way is to drive ſheep over the ground. Their feet will thruſt the ſeed in again, and a very light harrowing after this will cover it excellently. This practice is not unlike the gardeners way of covering ſeed, by trampling it in, and then raking it. We know that no ſeed is better ſown than what is thus managed; and we may be certain, that what ſucceeds ſo well in the garden, will not fail in the field.

Perhaps an improvement upon this method may be eaſily made, by a ſhort tined harrow. The ſheep, by treading in the wheat, will naturally trample down the clods, and bring the ground to a kind of level; and when it is in this condition, the long and ſharp tines of the common harrow cannot be neceſſary for the covering in the naked corns: the kind of harrow we propoſe would lay all level, in the manner of a garden rake; and the corn would be covered more regularly than it could by the uſual method.

We do not attempt to prefer this method to the drill ſowing, nor indeed to compare it with that excellent contrivance, for by that inſtrument all the ſeed corn is let in regularly, and covered equally. This method would be coming ſomething nearer than the common, to that regular practice, and would have a proportioned advantage.

CHAP. CXXIII.

Of clearing the ground for plowing.

THE farmer may often, by a very ſmall expence properly applied, ſave a great deal both of charge and trouble, in his ſucceeding work. The quantity of large ſtones which they plow in among their ſtiff loams, in many parts of this kingdom, would be much better picked off firſt. The plow would perform its office the more perfectly, and the corn would have a fairer chance.

Where this is omitted, a very careful eye ſhould be kept upon the plowman; for unleſs he does his part with fidelity and integrity, the ground will in many places have very little benefit. Every large ſtone will turn up the plow, unleſs the perſon who holds it be very careful, and very diligent; and even in this caſe he ſhould be relieved at times by another, for the labour is too great for any one man to keep the plow fairly preſſed down in ſuch a ground.

What we ſay here relates to large ſtones only; ſmall ones have not theſe inconveniencies, nor are they hurtful to the crop as the large ones are; they often help the ground.

All the ſucceeding operations of huſbandry are interrupted by large ſtones, as well as the plowing. It is impoſſible to roll the ground well, for the irregularity of the ſurface made by theſe ſtones, raiſes up the roller in ſeveral places, and makes it preſs unequally in others. The roller is intended to cruſh and break the lumps and clods which came in its way, theſe being only earthy, but it can only preſs theſe ſtones in, and that very imperfectly. They give the ſame diſturbance in harrowing, and afterwards in the raking up of barley. Indeed they are, on all occaſions, ſo great a diſturbance and interruption to the work, that it is an unpardonable piece of negligence to leave them on the ground. In tough ſoils the ſtones make ſuch a deſtruction of the tackle, that common œconomy would teach the farmer to have them removed, before he ſent in the plow; if there were no other motive. Clay that has lain to be very hard, and has large ſtones in it, will hold them ſo faſt, that the plow cannot remove them. And all the advantage of having a careful plowman who ſhall fairly attempt it, will be the turning up a very few, and the breaking of the plow againſt others; neither can the other operations be performed at all, without more cattle, and more expence; and then very imperfectly.

Theſe are the reaſons, and they are very plain ones, why the farmer ſhould be at the ſmall charge of having theſe larger ſtones cleared off the ground; and they are needed in all their force, for nothing is more neglected.

Clayey ſoils are thoſe on which the ſtones of this larger kind are moſt troubleſome, and do moſt damage: there are grounds ſo light and dry, that it is an advantage to have ſome ſuch aſſiſtances; but here flat ſtones, not heavy lumps, are what do the good. The others ſhould be taken off even from thoſe.

Of all crops, there is none to which theſe ſtones do ſo much harm as clover: they muſt with double caution be picked from thence; nor is there any expence of labour in getting them out of the ground, that will not be amply worth while for the ſake of the crop. The advantage of a ſingle mowing often making up for the whole.

Let the farmer underſtand in this whole direction, that the large ſize of the ſtones is what makes them detrimental to the land; and let him diſtinguiſh what are the kinds of ground that ſuffer moſt by them. We have told him, in the preceding volumes, that there are lands to which ſmall ſtones ſerve as a kind of manure; and the inſtance is famous in hiſtory of thoſe, who by laboriouſly picking every one off grounds where they were proper, rendered them barren, and found no way to relief but by putting them on again. Reaſon muſt direct in all the operations of huſbandry, elſe the beſt rule being miſapplied, will do nothing but miſchief.

CHAP. CXXIV.

Of rolling.

THE intent of rolling wheat-land after it is ſowed, is to preſs down the little lumps, and make the mould lie cloſe to the grain. This is the more neceſſary, as the ground is lighter; and where it is lighteſt and looſeſt of all, the turning in ſome ſheep to tread it down, anſwers the purpoſe better even than the roller, for their feet being ſmall and hard, and preſſed by the weight of the body, leave no ſpot untouched, nor any ground looſe.

In the rolling of plowed lands, the heavier the roller is the better: and in the caſe of ſuch as are very weighty, let the farmer take care he allows horſes enough to draw them. If theſe creatures find the weight hard to pull after them, their feet do a great deal of damage, by forcing the ſeed out of its place, and treading it in too harſhly: but when the roller is heavy, and the cattle draw it eaſily to themſelves, every clod of earth is broke, and the ſeed, while it is fixed in its place, has yet a free ſoil to ſhoot through, without any thing to turn the firſt ſhoot out of its courſe.

More caution is neceſſary on this account, when the corn is up before it is rolled; for if the roller drag heavily, the young growth will ſuffer very much by the feet of the horſes. In this caſe the horſes ſhould never go in a length, but two abreaſt, that there may be the leſs trampling in one another's footings.

It is a practice with the farmers in ſome countries, where many of the lands are ſtony, to nail their rollers all over with broad-headed nails, that they may take the more effect upon the ſtones, and may not be worn by them; but this is a very fooliſh cuſtom; eſpecially in rolling when the corn is up, for the blades are cut to pieces between the iron and the ſtone, though they might have eſcaped between that and the wood.

In looſe land, which is free from lumps, at leaſt from hard ones, the ſooner the roller is brought on, after ſowing, the better: for the purpoſe will be anſwered, and the body of the grain being hard, cannot be hurt; but in ground that is full of lumps, and thoſe too hard to break freely, the beſt time of rolling is juſt after a ſhower of rain; for they will then fall to pieces under the roller, though they would have reſiſted it, or only have been preſſed into the ground by it before.

The ſhallower wheat is ſowed, the more neceſſity there is of rolling it; we ſee inſtances of its ſucceeding very well without any rolling, where the ground is looſe, and the wheat is ſown deep. When they plow round furrows, and lay in the corn deep, even though the ſoil be looſe, it ſucceeds very well: for it grows as readily from that depth, as if nearer the ſurface; and the lightneſs of the coat of the ground in that part does no harm, for the grain is ſecure from accidents by its depth, and it roots downward.

The rolling wheat immediately after ſowing, is a very good practice, for the mould is better fixed about it at once: the froſt is kept out by the cloſeneſs of the ſoil; and the effect of the unfavourable ſeaſons that may follow, is very happily prevented.

The rolling of clover ſown upon light ground, in winter, is always of great ſervice to it, by preſſing the mould to the ſeed.

CHAP. CXXV.

Of feeding of cattle.

WE are in too much haſte to kill our cattle in England, and by that ſpoil the greateſt part of our food. Sheep ſhould not be killed for mutton till ſix years old. In our haſty way of feeding, we bring a cow calf up to the condition of beef in leſs than three years; but it is wrong: for the creature grows till ſomewhat more than three years old, and there can be no good expected of it till that is over. Oxen grow longer, and for that reaſon ſhould not be killed till later in their time. They have not their full maturity till five years old, and the largeſt kinds of all not till ſix, and they will never fatten kindly for beef till that time is paſt. The fattening of ſuch cattle as are juſt at the prime of their growth, is very eaſy, for they naturally are inclined to it at that time, the conſumption of nouriſhment for their growth being juſt over, they will feed upon almoſt any kind of food, and will fatten upon hay as well as upon graſs: but older cattle do not ſo readily take to fatneſs; and the beſt method is by very rich and good freſh paſturage.

Corn is excellent for the fattening of cattle, becauſe it fills them with a ſound fleſh, and excellent fat. At all times the country gentleman ſhould feed them thus for his own table: and when corn is cheap, it will be worth the farmer's conſideration; for he will get both credit and profit from it.

A very natural imitation of this excellent practice, is the giving cattle the larger kind of malt duſt, called the tails of the malt. The proper corn is barley, and the next in goodneſs to this is oats; either will anſwer very well. They ſhould be ground, and given the beaſt dry. When malt duſt is uſed in the place of corn, the cuſtom is to boil it in water, and in this manner the creatures will eat it very freely. A quart of the malt duſt is enough for a gallon of water; and the creature may have a meſs of it three times a day. The effect of it appears to the eye to be the ſame with that of the corn, for the creature grows plump upon it; and any one would ſuppoſe it in fine order: but the fat is not ſound, and it is really a deception. No one would feed cattle in this manner for his own uſe; and there will be no credit got by ſending them to market. The merchant knows the old proverb is true, which calls integrity the beſt wiſdom, and the farmer will find it equally: in all his dealings let him be honeſt, and his character will be a fortune.

No food makes an ox or cow fatten ſo well, as good graſs; the paſture of upland grounds is beſt from ſpring to Midſummer; and from Midſummer till ſpring again the lower ground, where graſs has more moiſture. Theſe will always finiſh the fattening, but the high grounds are beſt for laying the foundation: for their paſturage is the moſt healthy, and health is the beſt ſource of fatneſs.

We ſee ſheep which have fallen into diſorders by feeding in low grounds, grow well without remedies, by being removed into ſuch as are higher, and more dry; and in the worſt caſe of all, as in the rot, where there is need of the moſt powerful medicines, they take effect much the ſooner for this change of food; and in many caſes will not ſucceed at all, but with this aſſiſtance.

Therefore reaſon as well as experience direct this courſe of feeding, that cattle ſhould be turned firſt into a very good dry upland paſture for a ſmall time, where they may have reſt, and this wholeſome food; they will thus lay in a foundation of health and good condition, and being after that turned into lower grounds, where there is abundance of food, they will have good appetite and good digeſtion, and will fatten perfectly. This is the natural and the creditable

ble way; and when corn is dear, nothing more needs to be done; but when there can be an addition of oats or barley in the manner we have directed, the advantage will be very great. The beſt time of giving this, is toward the end of the feeding.

Clover is excellent to lay a foundation for fattening of cows; but when winter comes on, they muſt be removed out of it into the aftermath of the common paſtures: for the broad leaves of the clover detain ſo much dew, that they are wet all day, and cattle will never fatten upon food that has too much water in it. The nouriſhment of the common graſs at this time, and in this condition, is not to be compared with that of clover at the ſame ſeaſon; but we ſee by this, that leſs nouriſhment will do better, where it is not overcharged with moiſture. There is no article more delicate than that of fattening of cattle; few are of more importance, and ſcarce any is ſo little underſtood. What has been written in general is obſcure, always confuſed, and often contradictory: experience and obſervation are the only guides; and what we give the reader, is the reſult of the experience of others confirmed by our own. Mr. Liſle has enquired into this article with attention; and we owe to him a great deal of the uſeful knowledge we have communicated on this and the preceding head to the reader; but we give nothing on his or any author's words alone; nor are we ſo raſh as to contradict without authority of obſervation. Nothing could be ſo idle, as to oppoſe opinion to experience. But where we have ſeen confirms what he had heard, the reader has it; and he may place ſo much the more dependance on it, as there is the weight of additional obſervation.

Some foods are excellent for ſmaller cattle, but are limited to that uſe. We have obſerved in the preceding volumes, that hop trefoil is excellent for ſheep. Mr. Liſle quotes the obſervation of a farmer of experience, that this plant and broad clover made into hay, would not fatten large cattle well. Mr. Liſle fancied it was only in regard to the vaſt oxen of Wiltſhire, that this was true: but experience ſhews, the farmer was in the right. How far the broad clover enters into this aſſertion, I cannot ſay, not having ſeen fair trials of it ſingly; but the hop trefoil hay, though it is a wholeſome and excellent food, will not anſwer in the fattening any kind of oxen whatſoever. Nor indeed does any dry food anſwer that purpoſe perfectly.

To ſpeak from the general reſult of a careful obſervation; there ſeem to be three ſtages of feeding in the bringing cattle to their greateſt perfection for the butcher. The firſt thing is to give them health, ſtrength, and vigour of conſtitution, which is beſt done by hearty food that has but little moiſture; ſuch is the graſs of upland paſtures; and of all others, thoſe paſtures which abound with this kind of trefoil, whether the plant grow naturally there, or be the reſult of art, the farmer having ſown it among the graſs: the hay of ſuch clover or trefoil alſo will anſwer excellently for this purpoſe. The ſecond ſtage of feeding is by giving them plenty of nouriſhment, which is moiſt and rich, though not too watery. This gives abundance of fleſh and fat; and finally, the laſt ſtage of all ſhould be the finiſhing them with a little dry food of the corn kind, which will harden the fat, and give both that and the reſt of the fleſh due firmneſs, and an excellent flavour.

The farmer is aware of the advantage, indeed, of the neceſſity of this laſt article in the feeding of hogs; and it is ſtrange it never ſhould have occurred to him, that the ſame benefit would certainly flow from the ſame practice, in regard to cattle of a larger kind. Whatever food he has uſed to bring the hog into fleſh, he finiſhes it up with peaſe, to give that due quality to the fat on which the value of the bacon depends. Peaſe are the hogs corn; and what they do for that animal, corn will for the ox or cow. This is the leſſon which reaſon would inculcate, and he will be happy who follows it.

There is great uneaſineſs attends the attempt, when cattle do not take to fattening kindly; and often they are in but very indifferent condition, when they deceive not the owner alone but the ſaleſman. This method of feeding will at all times prevent theſe uneaſineſſes and diſappointments, and the farmer will have not only quiet but credit.

Among all the artificial graſſes, as they are called, none is ſo fit for the fattening of cattle in the ſtate of hay as lucern. It will anſwer the purpoſe of other food when ſcarce, during the winter; but in ſpring ſomething muſt be done to keep it: for by that time the hay grows dry, and has loſt the beſt of its fattening quality. This, however, is an excellent food by way of preparation; and the creature will be ſo well in health and ſtrong upon it, that till the very end of the feeding, little more need be done. In ſpring let him be turned into ſome good paſture ground, before it is laid up for hay; and let the finiſhing be with corn, as already directed. This will give the greateſt perfection.

CHAP. CXXVI.

Of driving cattle.

ALL the farmer's care is often fruitleſs in the fattening of cattle, when he depends upon a diſtant ſale; for the careleſſneſs or ill management of the drovers, will reduce a fat ox to a very poor condition. Quietneſs in driving is a great article; and good food upon the road is another. An ox upon the road ought to have ſeven pound of hay for his evening bait; and the ſame quantity in the morning. If he have leſs than this he will loſe his fleſh. The cuſtom is, to throw the quantity of hay that is to ſerve for evening and morning into the rack together; but it is a bad one: an ox is a very nice creature, and does not feed freely on the food he has breathed long upon. The creature would eat it with the much better reliſh, if it were divided into two equal parts, and given ſeparately night and morning.

When cattle are overdrove they grow faint, weary and ſickly; and it is then the beſt way to ſell them as quickly as poſſible. They will fall into illneſſes if not diſpoſed of; and they will ſell much beſt while they are juſt come in and warm; for they feel better while that warmth is in them, than they will when they have ſtood to be cold.

With regard to cow-beef, the older the creature is, the more perfectly it will require to be fattened, for the fleſh of a young cow will eat tolerably, though it be but half fed; but that of an old one, till thoroughly fatted, is ſcarce eatable.

In buying oxen for feeding, a great deal of regard muſt be had to the health and ſhape. If they be not well, nothing will make them take to feeding till they are cured; and it is not the farmers buſineſs to ſtand that hazard. If his cattle fall ill while he has them, we have told him what are the remedies, but he is diſtracted who buys them ſo.

It is a common notion, that no ox will fatten well unleſs his bones lie even and well; but late experience proves this to be an error: provided the creature is in health, this is of no conſequence.

A thick leg is a good mark of an ox that will feed kindly; and the larger his foot the better.

Another excellent mark is the firmneſs of the ſkin about the neck. Many oxen have it hanging lank and flabby, but theſe never fatten ſo well as the others. A good breadth between the huckle bones is another eſſential circumſtance; indeed, the moſt eſſential of all: for it is this which gives room for his feeding. A depth in the briſket is ſuch another article; for this is a point that gives room for feeding. Therefore, the deeper the creature is from the upper part of the ſhoulder to the neck, the more is to be expected from him, when well fed. Finally, he ſhould be ſhort rib'd, and regular made in that reſpect, for a falſe rib that lies deep, makes the flank fall in; and is always a diſagreeable thing to the grazier.

CHAP. CXXVII.

Of lime.

THE uſe of lime, which is now in a manner univerſal, may be extended almoſt to all ſubjects, as well as all places; and the advantages ariſing from it, are more than thoſe which firſt appear.

The two great diſadvantages in a crop of turneps, are their being ſubject to grow ſticky; and their being eaten by worms. Both theſe the uſe of lime upon the ground prevents. Experience ſhews, that the juices continue longer in the earth which has been fertilized by lime, than in that which owes its richneſs to any other manure; and this prevents the roots of the turneps from growing hollow or ſticky. The other effect is very plain; for the great quality of lime after its fertility, is the deſtruction of inſects.

This gives it, on many accounts, a vaſt preference over dung, when the crop to be raiſed is of the root kind. We know by very troubleſome experience, that dung gives an ill flavour to roots, and that it promotes the breeding of worms. Lime gives an equal degree of fertility to the ground, at leaſt; perhaps a much greater; and it always gives a ſweetneſs to the roots, at the ſame time that it preſerves them in good condition a long while, and deſtroys the inſects which would deface and devour them.

The turnep is not the only root which may receive benefit from this manure: carrots are very profitable to the farmer, and the ground wherein they delight to grow is of a nature that very well agrees with this manure, for lime does no where better than on light dry ſoils. The experiment has been made laſt year in a ſmall ſpot of garden ground, and ſucceeded happily. The carrots took their growth very quick, and conſequently were extreamly tender; and none were ever ſweeter taſted. There was not one in the crop worm eaten, nor a worm to be ſeen in the ground, till we came to a depth beyond where the effect of the lime had reached. This was more particular than it would have been, if the worms had been utterly deſtroyed or driven out of the ground; for that manure muſt be very powerful indeed which could keep them at ſuch a depth, when there were roots of which they are ſo fond in the upper part of the ground.

The only inconvenience to which a turnep field is ſubject, where lime is the manure, is that the fly may poſſibly come, which takes the plants in the ſeed leaf. This it has only in common with other grounds; and the beſt way yet found to be ſecure againſt this, is by ſteeping the ſeed. Many ingredients have been uſed for that purpoſe; but the receipt which has ſucceeded beſt within my knowledge upon late trials, is this.

Bruiſe an ounce and half of camphire, tie it up in a piece of muſlin, and put it into a large bottle, with two quarts of rain water; ſet it by cold, and ſhake it every day for three weeks. Then ſhred ſmall a quantity of tobacco ſtalks, or other refuſe of tobacco, and bruiſe an equal weight of wood ſoot. Pour upon theſe as much boiling water as will wet them very well. Stir the whole about, and let it ſtand twelve hours; preſs this out hard, and add to it the camphire water, which will by that time be very ſtrong. Mix theſe two liquors together by a good ſhaking, and then ſteep the turnep ſeed in them. When it has lain the uſual time, pour off the liquor into a pan, and let it ſtand by, then ſift over the ſeeds a mixture of four parts lime, and one part flower of brimſtone. When the ſeed is candied as it were with this, ſow it; and four days after ſprinkle over the ground the liquor in which it has been ſteeped. This will promote the growth of the ſeeds, and at the ſame time it will render the mould about the plants, and the ſeed leaves, which it will thoroughly impregnate, ſo nauſeous to the whole inſect tribe, that nothing can tempt them to come near the place.

According to the newneſs or ſtaleneſs of the ſeed, and to the dryneſs or wetneſs of the ſeaſon, this liquor ſhould be ſprinkled over the ground. The intent of it is to penetrate into the ſeed leaves, juſt as they are beginning to ſwell for their growth: for in this caſe it abſolutely enters into their very ſubſtance, and renders them hateful to thoſe creatures, which otherwiſe would have fed on them. If it be thrown on before the ſeed have lain long enough in the ground to ſwell and crack, it will anſwer no purpoſe, for the ſeed leaves which it ſhould impregnate are not yet formed ſufficiently to receive it: and on the other hand, if it be omitted till they are hardened, it will run off from their ſurface, and give no laſting tincture to their juices.

Where I have ſeen this tried, it has ſometimes ſucceeded extreamly well; and at other times, though all the ſame precautions were uſed, it anſwered but moderately. There require many trials to aſcertain this; but there ſeemed to me, in thoſe inſtances I had opportunity of obſerving, to be a great deal dependant on the ſeaſon. When a dry time followed, the flies were but few upon theſe plants, though in general this favours them: and, on the contrary, when there came ſome ſharp and haſty ſhowers, the flies ſeemed to have fallen from the clouds with the rain, for they encreaſed upon it; whereas it was more natural to have ſuppoſed they would have been deſtroyed. We are not to judge in theſe inſtances by what would have been the caſe without the uſe of the liquor; but it is probable that in the dryer ſeaſons it took effect, becauſe it lodged on, and in ſome degree penetrated into the ſubſtance of the leaves; whereas, in the other caſe, the haſty ſhowers waſhed it off from their ſurface. It is for this reaſon the liquor is here directed to be ſprinkled ſo early on the ground, that it may have the better opportunity of abſolutely penetrating into the ſubſtance of the tender ſeed leaves, and may be out of the reach of a haſty ſhower to waſh off.

CHAP. CXXVIII.

On recovering a crop of decaying peaſe.

THE drought that happened in the earlier part of the preſent ſummer, threatened a farmer's pea ground, which lay near his houſe, with an entire deſtruction, juſt at the time of their flowering. The common obſervation is, that the ſeaſon which happens juſt at the blooming time, determine the value of the crop. It ſhould be warm and moiſt. There was warmth enough; but the want of rain made the leaves turn pale, and the ſtems grew dry and harſh. The farmer was a diſciple of the new method in huſbandry, and he now was determined to try its promiſed advantages. The ground of this pea field was very light and looſe, and he had ſowed them in rows, though not at that diſtance the directions of Mr. Tull require. The regularity of the crop however gave him opportunity of working between the rows, and he determined to uſe it. There was not room for a plow of any kind, for the intervals were trifling. But he took advantage of the looſe nature of the ſoil, and ſent in four hoers, whoſe work he over-looked himſelf. They had ſtrong hoes, and he made them cut into the ground every where to the full depth of the blades of them. The conſequence was ſuch, as ſhews very plainly the truth of all we have advanced upon that head, ſince this imperfect way of breaking the ground, anſwered the purpoſe of the farmer, even in a time of abſolute drought.

Mr. Tull has ſaid, and we have repeated it under the ſanction of more experience, that the horſehoeing of lands while the crop is upon them, will, in dry ſeaſons, anſwer the purpoſe of watering. This was the very experiment that was tried upon the preſent occaſion. The ground was excellent, and it was in fine order; the peaſe had taken their growth to the time of flowering, with all poſſible regularity; and there wanted now rain, and nothing elſe, to make them flower in great perfection. It was deficient juſt at the time when wanted moſt of all; and the farmer ſaw the effects, and gave up his crop as ſpoiled: watering the whole field was a labour not to be thought of. Hoeing was a great deal, but much leſs than the other; and it would anſwer the purpoſe of deſtroying a young growth of weeds, as well as that of ſupplying moiſture.

The ground was very well wrought throughout with theſe ſtrong hoes; and the farmer who was intent upon the conſequence, as he had ventured a conſiderable ſum, out of the common courſe of his buſineſs, watched the peaſe from day to day; he ſoon found that the earth which had been dry before, was moiſt after this work; and he ſaw the leaves of all the crop grow plump and green again. He obſerved the ſtalks began to look round, and freſh alſo at the bottom, and in a little time more the ſame thriving aſpect appeared in the upper parts of the ſtalks, and in all the branches.

There is a peculiar look in things which are in health, and the farmers know it better than the philoſopher. In particular, the field pea, when it is in perfect vigour, has the ſtalk covered with a kind of bloom, like that upon a plum: a ſort of looſe light powder, which gives an aſpect of great health, and which, when rubbed off, preſently appear again. It is an exſudation from the glands of the ſtalk, and is the ſame kind of matter that in others, where it is more tough, and eaſier hardened by the air, forms hairs, or a downy covering; making what the botaniſts call hairy or woolly ſtalks.

This or light covering of the ſtalk had fallen off entirely in the crop of peaſe, when they grew weak, but it was reſtored to them now they were ſtrong again; and the owner who knew very well its importance, was eaſy, as ſoon as he ſaw it return. The event anſwered his expectation, and the crop bloſſomed very finely, and produced abundantly.

This was a very imperfect method of breaking the ground, in compariſon of that which is propoſed by horſehoeing, in the intervals of crops planted at a due diſtance for that operation; but it ſhews the truth of the propoſition on which that practice is founded, namely, that breaking the ground, and tearing it up with a new ſurface, not only affords more nouriſhment to the plants, but abſolutely anſwers the purpoſe of watering them. Perhaps indeed this is one of the great articles by which the freſh breaking of the ground becomes ſo exceedingly ſerviceable to the crops, for there is no doubt of the great ſervice of moiſture, which they by this means receive while they are growing; and the ground being at the ſame time turned up about their roots with a looſe and freſh ſurface, the moiſture which they receive muſt come to them impregnated lightly, with the lighteſt part of the mould. This gives a double force to the practice of horſehoeing; and we may the more eaſily believe from reaſon, what experience will afterwards ſhew us, of the vaſt benefit which is always the immediate conſequence of this practice. It is owing to this, that light lands are found to receive moſt benefit from it; for light lands are moſt apt to hurt their crop by drought, the moiſture which falls on them not only evaporating ſooner, but in many of them alſo running through the ground, where the under bed is looſe. All lands will receive great advantage by the breaking of the ſurface, while the crop is growing; but the lighter they are, and the dryer is the ſeaſon, the more will be the benefit ariſing from this practice.

When peaſe have been aſſiſted by this method, about the time of their bloſſoming they will produce fruit in ſuch quantity, that there will require a particular care in the managing them after they are cut.

The farmers find that the larger the bundles are, in which the peaſe lie upon the field, the more apt the pods are to burſt and ſhed the ſeed, eſpecially if there come wet while they lie out. The following cautions will be very uſeful. The richer the crop, the ſmaller ſhould be the heaps in which they are laid, becauſe the quantity of pods will be greater, in an equal quantity of this richer crop. It will be very plain alſo, for the ſame reaſon, that the more rain there falls, the oftener theſe heaps ſhould be turned; and indeed, in very dripping ſeaſons, they ſhould be divided again each into two ſmaller heaps. Peaſe get this miſchief by the wet lodging upon them, and by the damp vapour riſing from a whole large and wet heap. For no quantity of rain which fell on the pods, and run off again, would take any ſuch effect.

There is another bad conſequence of the peaſe lying wet in large heaps, which is, that the peaſe within their pods are ſpoiled even before they ſhed: for the damp penetrates through, and the mealy ſubſtance of the pea very readily imbibes and retains it, a fermentation is brought on by this, and the mealy part is hurt irreparably, or perhaps utterly deſtroyed before the other accident of the burſting of the pods happens. I have ſeen many very rich crops of field peaſe deſtroyed by this accident; and what makes it the moſt injurious, is, that the beſt and richeſt ſuffer moſt by it. In a poor crop, where the pods are few, the peaſe in them but half fed, the lying expoſed in very bad weather ſhall do little hurt, for the hard ſubſtance of the pea, and the toughneſs of the very fibres of the pod will prevent the moiſture from corrupting the one, or burſting the other: both theſe accidents being the conſequence of ſwelling of the ſubſtance. Whereas the tenderneſs of a full pod, and large peaſe, lay them open to the miſchief; and the ſame expoſure to the weather; which would do no hurt to the poor crop, will ſplit half the pods in this rich

one,

one, and ſhed the peaſe; and will ſpoil thoſe in the other pods, though they are kept very ſecure in their places.

CHAP. CXXIX.

Of the ſigns of a healthful pea crop.

MR. Liſle, who has made many uſeful obſervations, and recorded them with truth, though he be not very happy in his reaſoning upon them, obſerves, that the cloſing and opening of the leaves of peaſe ſhew the degree of coldneſs in the nights. The fact that leaves do draw together, and cloſe at evening, and expand again in the morning, is certain; but the cold has nothing to do in this appearance. And though it be of no conſequence in this frivolous light of determining the degree of cold, it is a very important ſign of the health of the plants, and always ſhould be regarded among others; as it will ſhew when the crop thrives, and when it wants aſſiſtance.

The leaves of all plants which have many upon the ſame foot ſtalk, draw together at night, and ſpread open again in the morning, when thoſe plants are in health: and the readineſs they ſhew in theſe voluntary motions, is a proof they are healthy. Peaſe and vetches, and indeed the whole pulſe and clover kinds, when they are ſtrong and flouriſhing, begin to draw their leaves together two hours before ſunſet; and do not open them again till as long after ſunriſe in the morning. During all the night, they are kept cloſed together, and this is called the ſleep of plants. It has effect only in ſuch as are growing, for it is a part of their principle of life; and while growing, the ſtrength of it is always proportioned to their degree of health. Therefore if the farmer ſees his peaſe keep their leaves expanded till ſunſet, he may be ſure they are not in a vigorous ſtate of growth; and if he ſees them open, even at the approach of darkneſs, he may be ſure the crop will come to little, unleſs he gives it good aſſiſtance by dreſſing or manure. This is a plain reaſon why peaſe ſhould always be ſown in rows, with ſpaces between them: they frequently want aſſiſtance, and when they grow in this manner it is eaſily given them; but in the promiſcuous way it is impoſſible. The farmer may be aſſured it is worth his while to give them this help, when they appear by ſuch evident ſigns to want it, becauſe the conſequence will be a very poor, or a very good crop. this is in his choice; for as no plant droops more readily than the pea, when it wants due nouriſhment, none receives it ſo freely, or ſhews ſuch immediate ſigns of the advantage.

It is at the flowering ſeaſon, and at the ſetting of the pods, that the aſſiſtance the farmer can give is uſually wanting; and there are no ſurer marks than thoſe Mr. Liſle has mentioned of the plants wanting it: theſe are the falling away of that light duſt on the ſtalk, and the not cloſing of the leaves at evening.

As to the cauſe of that motion in plants, and the prognoſtication of cold or heat from it, we are now better acquainted with the ſource of that real appearance, than to regard them. The only cauſe of the cloſing the leaves, is the approach of darkneſs; for the only cauſe which keeps them expanded is LIGHT; and they are always expanded in proportion to the degree of light. They begin to cloſe before the cold of the evening comes on, for it is as ſoon as the ſun gets toward the horizon; his light being then leſs, becauſe of the vapours through which it is ſent to us: in the ſame manner, in cloudy days, the leaves are leſs expanded than they are in bright and fair ones; and the farmers of an earlier time were more right, who preſaged rain from the cloſing of the leaves of their clover, than this late obſerver, who attributed the effect to cold.

The matter has been tried by repeated and careful experiments; and it is found, that plants of all countries are equally ſubject to it: and that the want of light is the only occaſion. The plants of the Eaſt Indies, preſerved in our ſtoves, anſwer to theſe experiments in the ſame manner, as the peaſe in the fields; and it is plain, that in theſe caſes the differences of heat and cold can have no power, becauſe the heat is the ſame day and night in theſe ſtoves, and is kept to the ſame degree, even by a thermometer. All the plants of thoſe countries which have winged leaves like the pea, or trifoliate like the clover, obey this law in nature; and whether they be more or leſs watered, their leaves cloſe at evening, and open in the morning in the ſame manner. Therefore neither heat or cold, moiſture or dryneſs, have any power in this matter, provided the plant have enough of each to keep it in a ſtate of health, and there is no other cauſe but light. Even the ſenſitive plant ſo long admired, and ſo little underſtood, is ſubject to the ſame law: and only differs from the reſt, in that it is more delicate. The leaves of that ſhrub cloſe at the approach of night, as they do upon the touch, and open again in the morning. This has been explained by many inſtances, and illuſtrated with various examples, in a treatiſe entitled, *the ſleep of plants explained*; and it is our province, in this place, to ſhew the uſe that property in plants may have in directing their culture. As light has this effect upon all the plants of the farmers crops, which have leaves of the winged or trifoliate kind, he may know by it what is their ſtate of health: and by a careful obſervation, he will learn from this the firſt appearances of their diſorders.

It has been ſuppoſed, all plants, except the ſenſitive, were deſtitute of motion; but we ſee theſe all have the ſame kind of motion, though from a different cauſe, and in a leſs degree. As motion is the extream perfection of the vegetable life, it requires the perfect ſtate of the plant, in order to its being well performed: the leaſt decay in the health of the plant weakens this power; and at length, if the plant is about to periſh, it is utterly loſt. Therefore the degree of health may be always known by it; and the firſt ſymptoms of a plant's ſickneſs, will be ſeen in the defect of this motion.

The farmer will ſoon perceive the truth of this, if he will look out into his fields of pulſe and clover, which are in good condition, at noon, in the afternoon, at night, and in the morning. The curious who have ſtoves, will ſee it moſt diſtinctly in the ſenſitive, the tamarind, the abrus, and the coral tree. And if they are deſirous to be ſatisfied that light alone is the cauſe of this wonderful effect, they may ſee it by removing any one of theſe in a pot from light to darkneſs at their pleaſure. The leaves will cloſe in half an hour, if the plant be ſet in the dark at noon day; and they will expand ſo faſt that it may almoſt be ſeen, when they are brought into the light again.

In a bed of garden peaſe, whereon the experiment has juſt now been tried of keeping them without water, and that in a light ſoil, the firſt appearance of their being ſickly was obſerved in the upper leaves loſing this power; and when all the other common ſymptoms of weakneſs had followed, the crop was recovered juſt in time by watering, and the power of motion in the leaves renewing itſelf gradually as the plants ſtrengthened themſelves, ſhewed exactly the ſtate of their health, and progreſs of their recovery. There is little merit in philoſophy, except it can be turned to uſe; and theſe experiments of naturaliſts are always frivolous, unleſs they can be applied to ſome good purpoſe. This evidence of the health of plants is plainly one inſtance, that what appears mere curioſity may have its important uſe; and it would be happy if ſome farther enquiry into theſe ſubjects, would give us tokens as evident, and as early of the decay or diſtemperature of the corn kinds. We find when thoſe valuable crops are ſtarved, by the change of colour in their leaves; but it is then ſometimes too late for any real ſervice; and at the beſt, when our care can reſtore the crop to health and vigour, there has been a check in the growth, which is never perfectly overcome. Now in the pulſe and clover kinds, this want of vigour to cloſe the leaves is a more timely notice. The leaves in all theſe plants will after this fade and decay; but the happineſs is, that we have notice of the danger in better time: and when it is ſeen ſo early, it is eaſily prevented. The diſeaſes of plants are ſo far like thoſe of animals, that it is much eaſier to cure them in the firſt approaches, than when they have confirmed themſelves by time.

CHAP. CXXX.

Of the benefit of tares upon a ſtiff land.

ALL the pulſe kinds improve land by the particular manner of their growth, which is the ſpreading out very much into ſtalk, and rooting very ſlightly. Their ſtalks alſo lying upon the ground in part, and their leaves being numerous and large, they ſhelter the ſurface, and mellow it to ſome depth: this is the benefit the farmer expects from them, beſide the preſent hope of their own produce; and for this purpoſe two things ſhould always be in his mind when he ſows them: theſe are, 1. What kind of ground moſt wants mellowing; and, 2. What manner or method of ſowing them will beſt anſwer the purpoſe.

The grounds which will get moſt by being covered and ſheltered, are thoſe which are naturally the moſt tough and firm; and the method by which they will be moſt mellowed, and leaſt exhauſted, is by the ſowing the pulſe in rows at ſuch diſtance, that the haulm, when well nouriſhed, will ſpread itſelf over from one row to the other. In this caſe the intermediate ſurface will be well ſhaded, and the plants not ſpreading their roots far any way, the whole will be little exhauſted, and thoſe intermediate ſpaces ſcarce at all.

When the farmer has ſettled within himſelf what piece of his land will receive moſt benefit from this kind of growth, let him conſider next what kind will moſt ſuit that piece, and beſt cover it. Theſe particulars often depend upon very ſmall circumſtances, but an attendance to them is the more needful, becauſe all the preference of one kind to another depends on them.

In regard to the ground, whatever piece lies moſt expoſed to the ſun, will receive moſt good from this kind of ſhelter, provided the crop be well choſen for that ſituation, and the ground have that toughneſs, hardneſs, or firmneſs, which make the pulſe crops moſt beneficial. When the encloſures are ſmall, the trees in the hedges high, and the ſoil itſelf not of a very firm nature, pulſe will give no improvement, becauſe the ſhade and ſhelter of thoſe trees, and the natural quality of the ground, will have kept it all along in that condition, whereunto it was expected to be brought by ſuch crops.

In fields which lie open, though they be ſowed ever ſo properly with peaſe, if the ground be naturally looſe and crumbly, they will get very little advantage. This points out the kind of ſoil and ſituation where moſt good will be obtained by the crop of pulſe; and in general that kind will do moſt good, which lies longeſt on the ground. Therefore the moſt advantageous of all theſe are the winter vetches; and the greateſt benefit that can be obtained by this kind of culture, is preparing ground for barley.

If the huſbandman have a piece of hard clayey land that lies high, and has little ſhelter, there is no method ſo advantageous as the ſowing a crop of the winter vetch, for the mellowing this ground for ſummer corn. He will receive a very conſiderable advantage from the crop itſelf, for the produce of the winter vetch upon ſuch a well wrought land, will be very great; and he may, without any other preparation, work that ground in the ſpring for barley. But if he ſhould place this dependance upon a crop of the very beſt pulſe in a looſer ſoil, he will be diſappointed; for ſuch ground does not want the mellowing for which thoſe crops are ſo valuable, nor does it receive the advantage from them. In this caſe the barley will come to little, unleſs there be a farther preparation of the land; and this is beſt done by folding ſheep upon it.

Some prefer peaſe to the leſſer pulſe, for this mellowing of ground; but there are many objections. Peaſe are not ſo hardy as theſe kinds, and therefore they cannot be uſed like them on all ſoils. Then beſide their lying a leſs time upon the ground they root deeper, and exhauſt the land much more, as they require a larger quantity of nouriſhment for their more abundant haulm.

A third reaſon why the winter vetch is vaſtly preferable to the pea, is, that there is a great quantity of a very rich juice ſecreted in the ſtipulæ, or little films, at the joint of the ſtalks, which is of vaſt ſervice to the ground. This is a kind of abundant nouriſhment, which is prepared for feeding the flowers; but as the plant does not want it, it is ſweated out upon the ſurface, and the next rains waſh it off. This is one of thoſe ſubſtances which immediately bring on a fermentation in the mould, and being received into the preſent ſoil, at a time when it is ſhaded, and kept mellow by the drooping ſtalks of the vetches, it operates in the full force; and the ground is enriched by it in ſuch a manner, that the particular ſpots on which it has fallen, might be uſed as a manure for other land. Theſe in the ſubſequent plowings become thoroughly mixed with the reſt of the ſoil; and that being all rendered lighter and hollower by the overchanging of the crop, is ready to receive it, ſo that it is immediately put into a ſtate of fermentation, very favourable to the growth of the new ſeed.

This is a reaſon not enough underſtood, but it is of great weight and force; and it is one cauſe why vetches are preferable to peaſe, for the mellowing and preparing of land.

Winter vetches have not the quantity of haulm or ſtalk that ſummer ones of the ſame kinds have; and if the ſame ſpecies be ſown for a winter, and for a common crop, the ſtalks of the latter will be much the larger and longer, but the growth of the ſtalk often ſtarves the fruit. The longer the ſummer vetch continues encreaſing in the haulm, the leſs is to be expected from it in pods; for the nouriſhment is waſted in the ſtalks and leaves, which ſhould form flowers, and fruit. It is obſerved, that when a crop of vetches continue growing in heighth or length of the ſtalk late in ſummer, the approach of the cold weather always ſets them to fruiting, by ſtopping the growth of the ſtems; and for the ſame reaſon, the winter crops do not run into ſtalk ſo much, and conſequently bear more fruit.

CHAP. CXXXI.

Obſervations upon graſs ground.

IT is a common error to leave the graſs ſomewhat high, at the time when the grounds are laid up for hay, though that be early in the ſeaſon; and the vulgar opinion is, that the crop of hay will be larger: but this is found now to be a very erroneous and hurtful practice. The hay neither is, nor is expected to be the produce of thoſe blades, which are left from the eating, not has the length at which they are left any effect in the ſucceſs of the ſucceeding growth, unleſs to injure it. The moſt advantageous method is to have it eat down cloſe, but to do this in good time: then the roots making a freſh ſhoot with vigour, that is carried up uninterrupted in its growth for hay, and no blade nor ſtalk but anſwers to the ſcythe, and makes good hay.

In this caſe the dung, the urine, and the ſweat of the cattle which feed upon the ground, all help to the nouriſhing of the roots; and when they are taken off from a well eaten land, the whole that is to come will be the produce of roots they ſupplied, unexhauſted by other growth. The laſt days of the feeding will alſo do more good to the ground than any other, becauſe the ſurface will be bare and open to receive the dung and urine; whereas when the growth is higher, they lodge upon the graſs, and a great part of their virtue is evaporated. This is the practice which reaſon directs, and the farmer who follows it will find, at the time of mowing, that every blade, as well as every ſtalk, cuts through with the ſcythe, and all is of a length and condition for hay.

On the contrary, when the cattle have been taken off, before they had half eaten the graſs, and the old blades remain five or ſix inches high in many places, the ground will not have had the full benefit of their dung, nor will the roots be in a condition of their beſt growth.

When only the ſtumps are left cloſe to the ground, they preſently decay, and the whole covering of the ground is new and young graſs; but when the remains of the leaves are five or ſix inches high, they retain the power of ſuction from the root; and though their grown ends remain in the ſame ſtate as they were left, and the blade themſelves get no encreaſe in length, yet they continue alive, and take up the place of other graſs; and in the mowing time, not only reduce the quantity of hay, but hurt the aftermath.

The mowers know them to their vexation, for they make the work very unequal and troubleſome. In the mowing a part of them are cut off with the proper graſs, but they are only ſhort ends, and are loſt in the making: when the dew is off, they bend before the ſcythe, and it paſſes over them; and when noon comes, and the reſt of the graſs has a firmneſs which juſt ſupports it for convenient mowing, theſe old blades become hard, and perplex the work, blunting the ſcythe. There is no good in theſe long remains of the old graſs at the beſt, and they are in many reſpects very troubleſome. The quantity of hay is the leſs in itſelf; and it is rendered ſtill leſs in quantity, by the raiſing of the ſcythe, when this is hardeſt, ſo that an inch is often loſt: and the after-growth is poor alſo in proportion.

It has been always known, that eating down a graſs crop made it grow the more, and this was attributed to the dung of the cattle; but beſide this, the very cutting down the old ſtalks makes the new ſhoot up more vigorouſly. When a farmer has been ſo ill adviſed, as to leave ſome part of a paſture ſtanding, becauſe it was thin when he was mowing the reſt, the conſequence has always been, that it has been afterwards the thinneſt and pooreſt piece of the whole ground. He has not only deprived himſelf of ſo much hay as it would have yielded, but has prevented the growth of the ſucceeding crop.

The common practice of gardeners, in the frequent mowing of their graſs walks, might have taught him better. It is a conſtant and certain obſervation, that the cloſer and the oftener they are cut, the thicker the graſs grows; and the conſequence is the ſame in degree in meadow ground, for nothing encourages the thick and regular growth of the graſs, like regular and cloſe mowing.

It is a cuſtom among the farmers about London to agree by the acre with their mowers, becauſe as they generally come ſtrangers, there is leſs dependance upon them for an honeſt day's work: but unleſs the huſbandman himſelf follow them at every ſtep, the dependance upon their doing their work well is much leſs; and he had much better pay by the day than by the piece. If he will agree in this manner, and follow them alſo at times, they will obſerve his direction to cut cloſe to the ground, and he will be many times overpaid by the addition of ſo much to his hay, while he is alſo at the ſame time ſecuring a better growth for the ſucceeding ſeaſon.

This holds true equally of the artificial and natural graſſes; and the ſame directions will anſwer the ſame, or indeed greater purpoſe in the mowing of ſaintfoine, lucern, and all the other plants, the ſucceeding growth always comes up the thicker; and the more regularly, the better the management has been in this reſpect. In common graſs it always does, and always muſt come immediately from the root; but even in the artificial graſſes, when the freſh growth is often made from the remaining ſtalk, this is beſt done, the ſhorter that ſtalk is left. When that is of conſiderable length, a certain number of ſhoots riſe from it in thoſe places where the other leaves have grown; but the more there are of theſe, the fewer there will be from the root; and it is thoſe from the root on which the huſbandman may place his greateſt dependance. When the ſtalks are cut cloſe, the root ſends up a great number of new ones, and therefore the way to make the ſucceeding crop thick, is to cut the preſent one cloſe. It is the ſame in eating down the crops, unleſs when they are young, for at that time the roots are very eaſily damaged, otherwiſe the cloſer they are eat down, the better the dung and urine of the cattle gets down to the roots, and the better the warmth of the bodies of the creatures nouriſhes the ground. The crop will riſe free, becauſe there is leſs of the old ſtumps to interrupt it; and the roots will have the more vigour, becauſe of the immediate courſe of the manure to them.

Gardeners, when they cut down the ſtalk of a perennial plant, cut them cloſe, becauſe they know it is fitter the new ſhoot ſhould be from the root, than from the ſide of the old ſtump; and we have ſaid on many occaſions, that what is right in the garden, is right alſo in the field. The nature of vegetation is the ſame, whether it be carried on with more labour in a ſmaller ſpot, or with leſs in a larger; and wherever it is poſſible to introduce the management of the garden into the field, it is advantageous to do it.

CHAP. CXXXII.

Of making malt.

WHETHER the farmer make malt for his own uſe, or for ſale, he ſhould attend the operation with the ſame care. There is a ſeeming advantage in obtaining an encreaſe in quantity, but it often coſts more than it is worth. There will naturally be ſome encreaſe, becauſe the barley ſwells in making the malt; but if this be managed purpoſely for an encreaſe, the farmer will deceive himſelf extreamly. He may eaſily have ſuch an advantage as a buſhel and half for the quarter; and with the management we direct him to avoid, he may have even two buſhels: but he ſhould know that this is not real; and that if he come to uſe the malt himſelf, it will make no more beer for this advance in quantity; nor if he carry it to market, will it produce him any more money. The cleanneſs of the malt is a great conſideration in the market price; and this will ſoon bring all to the ſame condition. A very ſmall reduction on account of foulneſs, will run away with more than the intended benefit, and in general they who abate for a bad quality in the commodity, are expected and obliged to abate largely.

When the maker finds more than a buſhel and half encreaſe in the quarter, he may reduce the difference to leſs than a buſhel by good cleaning, and this will always be ſo much gain; for the difference in the price between a quarter of clean and of fouler malt, will be more than the price of the half buſhel.

Often thoſe who deſign themſelves this advantage of the largeſt encreaſe in quantity, find they are reduced in the thing itſelf; for the encreaſe depending upon what they ſhould have ſeparated, that ſmall quantity will be loſt in the neceſſary moving about of the malt afterwards; and when it comes to be meaſured again before uſe, it will not anſwer to the quantity for which it was ſold, nor will the buyer be content with it, becauſe the reaſon of the encreaſed meaſure is very plain. The ſeller muſt either refund ſo much of the purchaſe money, or pay, what is dearer, ſo much reputation.

It is obſerved, that the beer brewed with pale malt is neither ſo ſtrong as that with the high-dried kind; nor will keep ſo well: but experience ſhews this is not a fault in the nature of the malt, but in the manner of managing it. For under the name of drying it pale, they do not dry it enough.

Pále malt may be as fully dried as brown, and will in that condition be harder, becauſe it will be dried without ſcorching; the effect of a ſcorching fire being always to make the ſubſtance brittle. When the pale-dried malt has length of time ſufficient allowed it in drying, the whole becomes very thoroughly done, and is hard and firm. And in this caſe the beer that is made from it will be ſtronger, than what is made from an equal quantity of the common high-dried malt; and with the common advantages will keep longer. It is not the great colour of beer which denotes its ſtrength; for the brewer very well knows this is owing to the ſcorching of the malt: the ſoundneſs and body of the liquor will ſhew it, in beer that is ſcarce coloured, for the ſubſtance of the malt may be in the paleſt beer, in the moſt full perfection. The way to know the abſolute ſtrength, is to take care the malt be good, and then compute the quantity.

In the making of malt, a great deal of its value, and of the ſtrength of the beer to be made from it, depends upon the abſolute degree of malting the grain. We know the change that muſt be made in the flower, in order to the change of barley into malt; and if any part of the grain be not changed in this manner, it is ſo much loſs; for that part which is not made, will be of no ſervice in the brewing. The barley, in its natural ſtate, would not make into beer, nor will any more of it than is malted properly and fully: all that part of the flower of the grain, which remains unaltered, will be uſeleſs in the brewing.

There is a mechanical method of knowing when the whole is made properly; and it muſt be of the greateſt uſe to the malſter to obſerve it. The ſpire of the grain ſhoots one way in the malting, and the fibres that would make the root another. The ſpire muſt be as high ſhot up within the rind, as the fibres are puſhed the other way, or elſe the grain is not malted. The alteration of the flour or meal of the grain, keeps pace exactly with the growth of this ſpire: and ſo far as that is ſhot, it will be found to be malted, and no farther; therefore the examining this ſpire will at all times ſhew the ſtate of the malt: for ſo far as it ran, ſo far the natural meal of the grain will be converted into the nature of malt, and no farther. The reſt will be uſeleſs: ſo that by the ill management of the malt in making, the brewer may be deceived extreamly in the ſtrength of his beer. He calculates that ſo many buſhels will make ſo many gallons of ſuch a ſtrength: and ſuppoſing this to be a certain point eſtabliſhed upon firm experience, his ſucceeding brewings may deceive him, if made with a malt that is thus imperfect, for if only one fifth of each grain be left unmalted, his beer will be certainly one fifth weaker, though all the ſame care and pains have been taken in the brewing; and the ſame quantities of all the ingredients have been uſed. Long cuſtom teaches the wholeſale brewers to judge of their malt with great exactneſs; but in private families no deception is more eaſy than this. Such malt as is thus imperfectly made, will look very fair to the eye; and perhaps the buying it a very little cheaper, may influence the perſon; the ſeller allowing a ſmall abatement, becauſe he cannot impoſe it upon the larger purchaſers. In this caſe, one fifth or more of the malt is uſeleſs, and the cheap bargain, as it appeared, will prove a very dear one: for the beer will not have its proper ſtrength.

In the ſame manner, when malt is made at home for the uſe of the family, if it be imperfectly done, there is a certain part which is of no uſe or value: and though all appeared good, the beer is much too weak for the allowed proportions. The method we have given to judge by the ſhooting of the ſpire, was firſt communicated to the author of the before-quoted obſervations, by an honeſt malſter; and it will never deceive. It is owing to the overlooking, or not underſtanding theſe ſlight appearances, in the malting and brewing, that the beer of private families is in general ſo much inferior to that of brewers. We have ſhewn before, how much it is to the intereſt and advantage of families to brew for themſelves; and we hope they will perfect themſelves in the practice, by attending to theſe inſtructions.

The method of trying malt, by throwing it into water, is very well known; for what is good will ſwim. This ſhews the change that is made in the grain; for, on the other hand, when the farmer is trying his barley for ſeed, he makes the experiment by water, and he finds it ſink. In the choice for ſeed, all is bad that ſwims upon the ſurface; and in that of malt, all is bad which ſinks. But there is a farther uſe in this experiment that they make, who are nice in their obſervations. Malt ſwims on the ſurface of water; and when it is perfectly made, it ſwims in a peculiar manner: let this be obſerved; and it will be found, that ſuch as is imperfectly made, though it ſwims, does not keep the ſame poſition on the water. This depends upon a very plain principle: if it be imperfectly made, ſome part of it is in the condition of the barley before malting: we mean ſome part of every grain; as the portion of the meal, for inſtance, which is beyond the end of the ſpire, according to the trial before directed, of the malt in making; this part of every grain will therefore be heavier than the reſt, and conſequently the whole grain cannot float on the ſurface of the water, in the ſame regular manner wherein the grains of that malt will, which is perfectly and thoroughly made. A handful of the malt in a baſon of water, will at any time make this experiment; and there are ſo many reaſons for brewing at home, that every article ſhould be added that can be uſeful to the perfecting the knowledge of it. In general, when a brewing miſcarries, the fault is laid in the wrong place; and unleſs it be underſtood, it never can be amended. The imperfection of the malt is oftener the caſe than is imagined; and the examination into the cauſe of miſcarriages ſhould be begun. Therefore it is in vain to quarrel with the water or the hops; the time of boiling, or the manner of putting them in, when the real fault lies in the principal ingredient itſelf, which a ſtrict examination ſhould have diſcovered, and which nothing can amend.

Among the various kinds of mixtures which have been made with barley for malting, that of oats, when properly proportioned, and rightly managed, ſucceeds by far the beſt. The ill ſucceſs of many who have tried this mixture, has being owing to their not underſtanding the right proportions. One buſhel to ſix, eight, or ten, has been a proportion tried by many, and various accounts have been given of the ſucceſs of mixing oat with barley malt, by thoſe who have made theſe trials, each ſpeaking in abſolute terms, as if the particular proportion he uſed were the ſtandard meaſure; and all mixtures of barley and oats would ſucceed accordingly.

Upon a careful enquiry into the effects ſince the publication of the preceding volumes, it appears, that when the oat is mixed in a ſmaller proportion than one eighth, it has no ſenſible effect upon the beer; that from one eighth to one fourth it gradually diminiſhes the ſtrength of the beer, but without giving it any particular quality; and that in the proportion of two parts barley malt, and one part oats, the brewing will afford a very pleaſant drink, worth the conſideration of all country gentlemen.

It is ſaid, that in many places a cuſtom begun in Hampſhire is now prevailing, which is that of ſowing an equal mixture of barley and oats to raiſe a grain for malting; but by what we have ſeen, and according to all we have been informed from thoſe who have made the trial, the proportion of two barley to one oat, makes the beſt drink, and in this proportion we have found alſo that theſe two grains will grow moſt favourably together. Theſe are reaſons why this proportion ſhould be recommended to all who are diſpoſed to try this pleaſant and wholeſome kind of drink. It may be, that though this proportion is better than any other yet directed, future trials may prove that a little addition to the one or other article, may be ſtill better: this ſubſequent experience alone can ſhew. We propoſe what appears upon the experience we have at preſent to be the beſt; and we may with perfect truth aſſure the reader, that this is worth his notice; if he will afterwards try ſmall variations, he will inform himſelf perfectly what is the beſt of all.

CHAP. CXXXIII.

Of the oak bud.

WE have given the farmer cautions relating to the poiſonous and hurtful plants and trees which are natives of this country: and have added to the account, whatever kind experience or undoubted authority has ſhewn to be of miſchievous qualities. It was with ſurprize we ſaw, in the obſervations of Mr. Liſle, an account delivered upon his own authority, that the oak was to be added to this number. This gentleman gives the fact upon his own experience, and affirms, that having lopped ſome pollard oaks of his own in ſpring, a number of cows were killed with feeding on them. The fact was of ſo much conſequence, that we have endeavoured to ſee it aſcertained or refuted by farther experience; and this ſeaſon cattle have been tried with a few leaves of the oak. They are not fond of eating them; and when they were induced to it by mixing them with other things, ſome diſorders have followed. Cattle which had browſed ſome ſmall wood alſo among which there was oak, which they gnawed with the reſt, fell into diſorders, from which they were difficultly relieved.

The ſeaſon of the oak being in bud was paſt, ſo that the exact tryal could not be made: but it is very probable what this gentleman writes is true: for the buds of many trees contain a much ſtronger juice than any other part; and we have ſeen that the leaves, at a more advanced period, bring on diſeaſes. The buds of the tree which we call tacamahac in our gardens, are covered with a very ſtrong and fine ſcented reſin, which is not to be found in any other part of the tree, in any thing like that quantity; and the ſame obſervation may be made in regard to many others: if this be alſo the caſe, in reſpect of the oak, it is not very wonderful that the buds ſhould be abſolutely fatal, when we ſee the leaves are very pernicious. Cattle are not fond of them while growing, but it ſeems that they will gnaw them greedily as they lie to dry; therefore they ſhould be kept out of their way in that ſtate. The uſual and natural taſte of the oak is auſtere and rough; but I have obſerved, that a kind of honey juice ſweats out of it in the lying, after it has been a few hours cut. Manna in this manner ſweats out from ſeveral ſhrubs and trees; and it is not improbable that this ſweetneſs may tempt the cattle to eat the buds and tops of the branches, which at another time they would not have touched. The diſorders which came on in the cattle which eat the oak leaves for theſe trials, were heat of the fleſh, difficulty of breathing, and coſtiveneſs. They were relieved by the gentleſt of the methods in the preceding volumes, where we have treated of feveriſhneſs and coſtiveneſs of cattle. Indeed it is probable that moſt of the diſeaſes of cattle, which we are apt, as well as the farmers, to attribute to very different cauſes, proceed from their eating unwholeſome herbs, from which nature does not in all caſes preſerve them. It is found by this example of the oak, that they will eat a thing, though improper for them, in one condition, which they will not touch in another; and we have obſerved on a former occaſion, that they will eat thoſe very poiſonous herbs in a freſh ground, which they would have avoided in the places where they were bred.

CHAP.

CHAP. CXXXIV.

Of ſpring lambs.

FRequently the ewes in early ſpring have not milk enough for their lambs; and ſometimes they are of ſo untoward a diſpoſition, that they will not permit them to ſuck. In this caſe the farmers reſource muſt be the feeding them with cows milk; and with a little management, this will ſucceed extreamly well, though for want of care and attention, many have given it up as a thing impracticable.

The common accident is, that the cows milk runs thro' the lambs, without affording them due nouriſhment. This is owing partly to its being too thick, and partly to its wanting that aſtringency, which is in the natural milk of the ewe.

It is the natural conſtitution of the cow to void her excrements thin; and of the ſheep to have them hard and dry: and the original of this in the calf is naturally from the cows milk. This therefore, if it diſpoſe the inteſtines, and nouriſhment of the lamb in the ſame manner, throws it into purgings. To prevent this, the following method has been found effectual.

Boil a quarter of a pound of tormentil root in a gallon of water, let it keep boiling gently a quarter of an hour, then ſtrain the liquor. Mix one fourth part of this with the milk that is given the lambs; and it will reduce it to a proper thinneſs, and take off its purging quality. The lambs will feed upon this as well and naturally as on the milk of the ewe.

THE
HUSBANDMAN'S KALENDAR,
OR,
DIRECTIONS for the care of his land and his ſtock, according to the twelve months of the year.

MONTH THE FIRST.

JANUARY.

THE farmer's great dependance is upon his wheat crop; therefore let that employ his firſt care. When he has had the common advantages of getting it into the ground in September, October, or November, it will be now in its natural condition of growth, and will require no aſſiſtance from him, except the care of his fences for protection.

When it has happened that he could not ſow his wheat crop in theſe moſt advantageous months, let him do it now. I have ſeen good crops from a January ſowing, though very rarely from thoſe of December: for in that caſe the froſts have ſo much power over the firſt ſhoot, that they often deſtroy it.

Let the farmer obſerve this caution. Even January is too early for ſucceſsful ſowing in open fields; but in warm encloſures it ſucceeds very well. There are two reaſons for this: the crop will be endangered in the expoſed ground, while in the firſt ſhoot; and it will be late ripe for harveſt. But it is not ſo in ſmall, warm, and well ſheltered inclofures: the young ſhoot is defended there, and the crop comes forward.

For this ſowing, the ground muſt be extreamly well broke by the tillage; and the ſeed ſhould be buried a little deeper than at other times: it will lie warmer, and the firſt ſprout will be more out of reach of froſt.

The drill huſbandry is much more proper for ſowing wheat in January, than the common method; becauſe by that every part of the ſeed can be lodged at a proper depth.

A piece of wood-land intended for tillage, will be very proper to ſow with wheat at this time. If the ground be cleared by the middle of January, the crops will come up ſufficiently ſtrong, and anſwer very well.

Thoſe parts of the land which are intended for ſpring crops, ſhould now be turned up deep with the plow, and thrown looſe on the ſurface. The ſucceeding froſts will break and mellow the ſoil; and it will be in excellent condition for the preparing for ſeed time.

Lay on manures that require the froſt and rain to break them; and yet muſt not be expoſed too long upon the ſurface. Soft chalk, and the ſhelly marles which fatten land, very ſpeedily, may now be laid on; and they ſhould lie three weeks before they are plowed in. Common chalk, and the hard or tough clayey or ſtony marles, require more time.

Plow up clay and other tough ſoils twice in the compaſs of this month; and if any thing of the ſandy kind have been added as a manure, let this ſeaſon of plowing be the more ſtrictly obſerved: the froſt aſſiſts greatly in looſening the ſurface of the clay, and letting it into the land.

Old dung may very properly now be brought upon the land, that is to receive a ſpring crop early. It may lie without damage a fortnight before it is plowed in, or longer, if the weather be unfavourable.

Clear paſture grounds from ſtones, ſticks, bones, and other kinds of rubbiſh, which have been brought on by accident, or with the manures, and would hurt the crop, and diſturb the mowers. Theſe things are eaſily ſeen at ſuch a time; the ground gets no damage by treading, and labour is leſs wanted on other occaſions.

The weather muſt in a great meaſure direct the huſbandman

man where to employ his labour this month. If the froſt be ſevere, he muſt attend principally to the management of his paſture ground, becauſe the land in tillage will not admit the plow, or other implements. When it is mild, he muſt employ himſelf in the tillage articles: and the more mellow and rotten his dung is, the better: graſs ground being of different ſoils, admits with advantage a diverſity of manures.

Where the ſoil is a fat loam, or a loam with a very large quantity of mellow earth among it, the beſt of all manure is old dung and pond mud mixed together. This may be conſidered as the general manure for theſe grounds.

The moſt favourable time of laying it on is now in the middle of winter, that there may be froſt to diſſolve and break to pieces the harder parts, and that the rains may waſh the whole into the ground, while there is no great power of ſun to evaporate the virtue of it as it lies ſpread.

The way of laying manure upon graſs ground, is to drop it in ſmall heaps at due diſtance; and firſt employing labourers to break and ſpread it well by hand, afterwards have it worked over with a buſh harrow.

This harrow is to be lightly drawn to and fro about the ground, till the whole quantity of the manure be torn to pieces, and ſpread over the place; it will then be ſoon buried among the riſing ſhoots of the graſs, which will grow up apace from the effect of its enriching quality, and what remains will have time to get thoroughly well into the ground.

Whatever dreſſing we order to be laid on graſs grounds, this, ſo far as its nature allows, is the manner of ſpreading it.

Where the graſs ground is very poor, this is a good time to lay on manure. The moſt common is dung: a week after this it will be proper to go over the ground with a roller. The weather will have ſoftened the dung in the mean time, and this, preſſing it flat to the ground, will prevent that little evaporation which might happen from the winds, and render it the more ready to be waſhed into the ſoil.

Look to every part of the ground where water may lodge, and ſee that the drains keep in good order. There is no time when the lodging of wet will do more harm. The roots cannot bear it, becauſe they have leſs vegetative power than at other ſeaſons; and it gives the froſts more power.

Whereever there is any lodgment of this kind, ſee whether it be owing to the filling up of the old drains, or to the want of more effectual ones. Open the old, or make new, according to the occaſion; and ſee that every part of the ground has its diſcharge before you leave it.

Next look to the field of artificial graſſes.

If the farmer have young clover in a field, that has looſe ſoil, let him look thoroughly to its condition, both in the leaf and at the root. If the plant appear weak, it is moſt probable the earth lies looſe about the roots. In this caſe, let him take the proper opportunities of turning in his ſheep upon it. They will feed upon the plants, and warm the roots with their dung; nor is this all the advantage.

The damage that the ſevereſt winter can do to clover, is not very great, if the roots be tolerably covered: if the ſoil lie any thing cloſe about them, they will get no harm: and for that reaſon when the farmer finds danger of the winter, with reſpect to a young crop of clover that is alone, his beſt method is to turn in his ſheep to eat it before the approach of the ſevere ſeaſon. The leaves and ſtalks which would have been perhaps in a great meaſure deſtroyed by the froſts, and long lying of the ſnow, will have anſwered their purpoſe, and been eaten; and the root being better ſecured than before, by the trampling of the cattle, which fixes the ground about it, will ſtand perfectly well: and having no head to ſupport during the winter, it will ſend up its leaves and ſtalks vigorouſly in the ſpring.

This is a ſeaſon alſo at which ſheep may be very properly turned into a field of young ſaintfoin.

The feeding upon the ſaintfoin ground is an excellent thing for cattle: it is full of a rich nouriſhment, and yet not rank. It fattens them, without breeding diſorders. Spring is the ſeaſon when it beſt anſwers this purpoſe, and this is moſt convenient to the farmer: the only caution he need have in this reſpect, is not to put heavy cattle upon it in wet weather: in any other ſeaſon, when the crop is well eſtabliſhed, they will not be able to hurt it; but their feet in ſuch times will do ſome damage.

Spring is the beſt ſeaſon for feeding large cattle upon it, and the autumn and winter are the moſt proper for ſheep: this very well anſwers the farmer's purpoſe. The great ſhoot of the ſpring is ſufficient for the cows and oxen, and the crop recovers itſelf ſufficiently for one mowing, after which there grows a young ſhoot that ſerves very well for ſheep, at a time when they want it; and they neither damage it by their cloſe eating, nor by their heavy treading. No food fattens ſheep ſo freely or ſo ſuddenly at that ſeaſon, and none is better for oxen in ſpring, or for milch cows, when eaten upon the ground, or green in the rack: it cauſes abundance of milk, and does not give it that ſtrong and particular flavour it has from the feeding on clover.

The general cautions we have given muſt be enlarged or retrenched, according to the ſoil and other accidents attending the crop. In a dry ſoil and dry ſeaſon large cattle may be turned in upon the growing crop, earlier than we have ſaid; and on the contrary, in a moiſt ſoil they muſt be kept out later. Nothing eſtabliſhes itſelf more firmly in the ground than ſaintfoin, giving it time; but when it is trampled upon young, in a damp ground and wet ſeaſon, it is damaged in ſuch a manner, as often never to recover it thoroughly.

Select a proper ſpot of ground for a crop of lucerne. We have, in the preceding ſheets, given a full account of its value; and the huſbandman will find nothing is more to his advantage than raiſing it. He muſt chuſe a piece of warm land that lies high. A dry loam is the beſt ſoil; and if there be a mixture of gravel, there is no diſadvantage.

This muſt be prepared well by deep and repeated plowings, and turned up to the air to be impregnated by its power during a long fallow.

See that the hay of the artificial graſſes keep dry, ſweet, and in good order, it will be of excellent ſervice now for the cattle; being richer and much more nouriſhing than any other kind.

If clover be at any time in danger from froſts, when it is ſown among wheat, and is yet young, from the earth, mouldering from its root by the froſt, the corn itſelf will not be ſecure in the ſame place: and one method will be advantageous for both; the roller properly introduced and carefully managed, will preſs down the earth without hurting the plants. The crumbly ſoils are moſt ſubject to this miſchance; therefore let him look particularly to theſe at the preſent ſeaſon.

Gardeners often find that the froſts throw their young plants up out of the ground. Whatever happens there, may alſo in the field; and the careful eye of the farmer is required to remedy the evil.

Look to the field of TURNEPS, and ſee which will be fitteſt for feeding upon the ground, which for drawing. Both will do excellent ſervice; for it is a ſeaſon when all kinds of cattle want good food; and when there is little of other kinds for them.

When they are to be eaten upon the ground, let cribs be ſet up for the holding of dry meat; and in thoſe fields where they are to be drawn, let the largeſt be taken up from time to time, and the reſt thin'd by this means. The common practice is to begin at one corner of the field, and clear as they go; but it is very wrong. There is no ſeaſon when roots do not gain ſomething in the ground; and in the way we direct, while a part are eating, the reſt will be improving: for the pulling up a part of them, is a kind of tillage for the reſt.

If oxen or cows are to be fattened in the houſe with turneps, chop the roots ſmall, and give them in a trough, and at the ſame time put hay, a little at a time, in the racks; the mixture of wet and dry meat is the true method. Theſe cattle will require very little water; nor ſhould they be ſolicited to drink: the turnep is juicy, and anſwers the purpoſe in a great meaſure.

Milch cows may be very well fed at this time of the year with turneps, hay, and chaff. The common practice is to mix grains with this food; but that, although it encreaſes the quantity of milk, ſpoils the quality. The other three ingredients give ſufficient quantity, and it is excellent in its kind.

The turnep is indeed a food almoſt univerſally uſeful. Horſes will feed freſh upon the yellow turnep, and thrive well upon it; and hogs may be fattened with field turneps boiled, and the liquor made into a marſh with bran. When they are allowed to feed on turneps in the field, there muſt be conſtantly hay or pea-ſtraw kept in the racks, and theſe ſhould be covered, that it may always keep dry. The ſheep will feed partly on this, and partly on the turneps, and it will preſerve them from the rot; to which wet food always makes them liable.

If oxen or cows are put into a turnep field for fattening, care muſt be taken that they do not choak themſelves by their greedineſs. Tho' turneps are an excellent food, they are not a natural one; and not being accuſtomed to ſuch morſels, they will ſwallow them ſo large, that they cannot get them down.

Surgeons, when any thing ſticks in peoples throats, force it down with a long piece of whalebone, with a knot at the end; and the farmer muſt be prepared to do the ſame kind of ſervice to his cattle. Nothing is ſo good for this purpoſe as a dried bull's pizzle, with ſome ſoft rag, tied about the end in a knot. When a beaſt is perceived to be choaking by a large piece ſticking in the throat, this inſtrument is to be thruſt down, and it will be relieved in a moment.

Nothing exceeds the turneps for feeding ewes that are ſuckling lambs, whether in the field or houſe: but while the ewes are big with lamb, they ſhould not be fed with them. Very bad accidents have happened from it; and not only the lamb has been loſt, but often the ewe.

In very hard winters deer may be fed with turneps, but this muſt be done with moderation and care, otherwiſe they fall into diſorders. We write for the gentleman as well as the farmer; and this is one very important uſe of turneps in his conſideration. Good hay muſt be given them at the ſame time; and the turneps muſt be allowed only in moderate quantity, otherwiſe they will feed too freely on this watery food, and fall into diſeaſes.

If the planting out of turneps for ſeed have not been done before, it may properly be performed now. The farmer muſt chuſe a mild day for the ſeaſon, that the earth may work eaſily; and he muſt prepare the ſoil well for them, and not take off any part of the head or upper growth. When they are planted earlier for ſeed, it is beſt to take off the top pretty near the root, becauſe the ſhoot will not be injured; but at this time the head for flowering is formed, and muſt not be damaged.

Look over fences very well; and where they want repair, or have openings and gaps, let them be ſtopped with all diligence and attention. This is the ſeaſon when they are moſt uſeful. The cold winds of January will cut off almoſt any of the tender kinds; and froſts locking up the earth, ſend all ſorts of vermin about for prey.

If there be new planted trees, take care they are not gnawed and barked; and if they want more ſhelter or defence, give it them.

Look over the coppice wood and timber plantation; pick away dead ſtuff, and throw it on the dunghill, its value in manure will anſwer the trouble of taking it up; and be very careful of the hedges round this kind of growth, for cattle in the preſent dearth of graſs, will be tempted to bite the tender ſhoots; and this is extreamly detrimental.

The ſtock in every kind will require the moſt care at this dead cold ſeaſon, that is neceſſary at any time of the year. They muſt have ſhelter as well as food; and the yard ſcattered over with ſtraw, will very well anſwer this purpoſe for many kinds; the dung and urine converting it into manure.

Where they are fed upon turneps as they grow, there muſt be ſome good ſhelter for them againſt the winds and driving ſnow; a hurdle thickened with ſtraw-bands, run acroſs the place where they feed, will be a good help, and they will get on one ſide of it or the other, as the winds change.

If the fiſh-ponds are covered with ice, let holes be broke, or a ſmall pipe laid in, as we have directed, that there may be air. The bees muſt be fed, if their own ſtock be not ſufficient for them; and in all theſe inſtances, the farmer muſt not grudge to ſupply thoſe creatures, which will afterwards ſupply him.

Let labourers, for whom there is no other employment, be ſent out to pick up, and get together manure of various kinds. Horſe dung, and the earth impregnated with their urine in the ſtaling places on common roads, mud from ditch bottoms, ſheeps dung from the commons, and even the dung of poultry, where there is ſufficient quantity about the yard. Let them alſo be ſent out to pick up the haulm of uſeleſs growths, and, when the weather will permit, to grub up buſhes in the leſs valuable paſture grounds. Theſe and the like refuſe being burnt to aſhes, and the aſhes mixed with ſome paſture mould; and the other ingredients now mentioned, will make a moſt rich and excellent manure.

Turn the dunghills and other heaps of manure. They will get great advantage from the air at this ſeaſon; and there is no time at which they are ſo ſecure from damage, by the diſſipation from the effects of ſun and winds.

Shrowd the pollard trees, and cut coppice wood; and where there is occaſion, fell timber. In all ſhrowding at theſe dead ſeaſons, be careful to cut off clean, and leave an even ſtump; for the wet that will fall cold upon it in this and the ſucceeding month, as vegetation has little power at the ſame time, will make its way wherever it lodges; and if the ſtump be rough, that will detain it, and it will rot that firſt, and afterwards the whole head. It is want of this care that renders pollards of ſo little duration. If they were well managed, they would furniſh a ſupply much longer.

The ſame rule muſt be obſerved in cutting wood in general; the bill or ax are the beſt inſtruments; and where they leave any jagged ſurface, it muſt be cut down to the level ſmooth and even. The rough work of the ſaw ſhould alſo be pared down even, with ſome one of theſe ſharp inſtruments.

THE HUSBANDMAN's KALENDAR.

MONTH THE SECOND.

FEBRUARY.

THE worſt of the dead ſeaſon is now over, and the farmer will, in a few weeks, have a great deal of buſineſs upon his hands. Let him, in the firſt days of this month, prepare for it.

Let all his land that is to be ſown in ſpring have a good plowing; and if he have any that is ſown in the drill method, with ſpaces for the horſehoeing huſbandry, let him now bring in that uſeful implement. Whether it be corn, or any other crop, let him plow up the middle of each interval alone, not come near the edges of the rows. There muſt yet be a good deal of froſt expected, and this would have too much power upon the roots, if the earth were opened near them.

In the mean time, it is perfectly ſafe at this ſeaſon to work the middle of the interval, for this will diſpoſe it to give free paſſage to the extreme roots, which the firſt warm weather will make the plants ſend into it; and in the mean time, it will be improving by the additional expoſure to froſt and rain.

If any crop planted in the drill way appear weak and poor, let a day be choſen when the froſt is not in the ground; and let hoers be ſent in with ſtrong handhoes, to work on each ſide of the rows of the crop, and draw up a quantity of mould about the ſtem.

This is an advantage no crops can have but thoſe ſown by the drill, becauſe no other ſtand regularly: but it is of great benefit. The weak part of the ſtalks are covered and defended; and now nouriſhment is given, the work is very eaſy, for the ground breaks freely after the froſts and wet of winter, and the benefit is the ſame that gardeners find in earthing up the ſtalks of beans, peaſe, and the like. Nor is the labour limited to this ſervice; for this hoeing clears the ground about the crop from the firſt ſhoots of weeds, which would have been very ſoon called up in a troubleſome manner by the warmth and rains of ſpring; and the feet of the workmen trample in and deſtroy many others.

This earthing up of the ſtalks, in a great meaſure, will ſave a ſpring weeding.

In thoſe fields where the rows are ſo diſtant as to admit the horſehoe, it will be proper to purſue the ſame practice. As that implement muſt not come near the rows, it will be a great advantage to give the plants this aſſiſtance by the handhoeing firſt. The feet of the hoers will have trod down the earth in the intervals, but the horſehoe coming in afterwards, will turn it up light again.

This is a very great advantage in the new huſbandry. If a wheat field ſown in the common manner appear to want aſſiſtance, another method muſt be uſed. A light ſprinkling of ſome very rich manure is the only reſource in that caſe.

What I have found moſt ſucceſsful is this: ſome pond mud, paſture mould, pigeons dung, and coal ſoot. Theſe being mixt in equal quantities, let a labourer early in the morning, toward the end of this month, when there is a proſpect of rain, go over the field, taking care how he treads, and ſprinkle this mixture in the manner of ſowing.

It will give an immediate ſtrength and warmth to the ſoil; the rains will diſſolve, and waſh it to the roots; and the field will ſhew the conſequence, by the colour of the plants changing from their yellowiſh to a deep ſtrong green.

This care being taken of the wheat, in whatever ſtate, let him next conſider whether he ſtill wants to put any ſeed of this moſt valuable of all crops into the ground. It may yet be done with ſucceſs under a proper management.

In the firſt place, wheat can only be ſown, with any proſpect of ſucceſs at this ſeaſon, upon land that lies high and dry; that is well encloſed, and kept in good order. He who ſhould attempt a crop in this way, upon ſtiff, wet, or low ground, will be certainly diſappointed. There are crops enough fit for every ſoil and ſeaſon, therefore let not the farmer, by an ill choice, diſappoint himſelf, and then complain of the uncertainty of his profeſſion.

If he chuſe more wheat, and have a piece of well encloſed land that lies warm and dry, and is light in its nature, and in good heart, let him not be afraid to ſow it, becauſe the ſeaſon is advanced to February.

The propereſt ground of all is, where wood has been grubbed up; after a turnep crop alſo it will ſucceed very well for ſuch land as we have named: after theſe growths the ground is eaſily put in order. Where a turnep crop has been juſt eaten upon the ground, the dung and urine of the creatures which have fed upon it, ſerves as a manure, and the cover of the plants has, in ſome meaſure, lightened the ſoil. A little tillage, after theſe advantages, and at this ſeaſon of the year, will bring it into good condition, and the ſpring rains will ſufficiently promote its growth.

If the ſoil be not quite ſo dry and light as we recommend, the more care muſt be taken in the management of it. In this caſe it is but to work with a double plow, and ſow the grain upon threebout ridges.

In other caſes, where the ſoil is proper, it will be beſt to ſow it in broad lands. As ſoon as the ſeed is harrowed in, let the farmer look to his dunghills for the beſt old rotten manure, and ſpread a covering of this lightly over the whole field.

If there be the convenience of employing a fold upon it, the advantage would be very great. For theſe light lands want treading, and the ſheep will be at the ſame time doing this ſervice, and enriching the ground: the ſeed will be better defended againſt froſts and vermin; and its ſhoot will be heartened, not delayed by this practice. Birds would be, in a great meaſure, kept away by the ſheep and their neceſſary attendance: and as the ſeaſon advances when they will have peaſe and the like large ſeeds, wheat will be in leſs danger.

There is a great deal of benefit in forcing the firſt growth of wheat that is ſown ſo late as this, for it is in danger of mildews and other accidents of that kind, more than ſuch as has taken an earlier growth; but the giving it a quick and ſtrong ſhoot at firſt, anſwers this purpoſe, and puts it upon a level with that which has been longer in the ground.

Next month will be the great time of getting barley into the ground; therefore let the land be well and carefully prepared for it in this.

Oats may be ſown with great advantage now upon all kinds of land that are proper for that crop.

Beans and peaſe are now to be ſown, and they will come up without hazard; and be ripe in good ſeaſon. The bean ſhould be put in the firſt or ſecond week in February, according as the ſeaſon is, ſooner or later, mild enough. Beans are apt to ſuffer in dry ſummers, but thoſe crops are moſt damaged which have the leaſt growth; therefore let them be put in early: they will not ſuffer from the cold; and the wet will ſet them to ſpeedy growing.

A very ſafe practice is the ſowing beans and peaſe in the ſame field, for if one of theſe crops fails, the other will ſucceed; and having ſo much the more room, will make up by its produce for the want of the other. Cold rains in May deſtroy many crops of peaſe; but beans are not hurt by them, and they will anſwer in the place of both where the other fails.

The difference of ſoil however, muſt be attended to in this matter, for that ſeaſon may be very proper with one kind of land, which is not with another.

Thus, in heavy land, peaſe cannot properly be ſown with beans in the beginning of February: the wet is too long detained in theſe ſoils, and if froſt comes on upon this, the crop of peaſe will be loſt. On the contrary, the wet favours the young ſhoot of the bean, and there is no danger of that crop.

The bean will bear other mixtures in the crop beſide peaſe; and, in particular, oats: it is a very good practice to ſow theſe together: they will take their growth very kindly upon the ſame ſpot, and when they come to be uſed, they do very well together for horſes.

The graſs lands will require the farmer's eye at this ſeaſon, for he muſt think of the ſucceeding hay. The common manure of pond mud and dung may very well be laid on this month, beſt toward the beginning: and where the graſs is thin, ſome rotten mould from under a hay ſtack is a very good addition; becauſe it contains ſeeds of the hay, beſide being itſelf an excellent and rich manure.

In the beginning of this month let deep rooting weeds be taken up; and if any ſhrubs have been ſuffered to ſtand, let them be drawn out of the ground in the ſame manner. When rains have fallen, let ſtones and other rubbiſh that have come on with the manure or otherwiſe, be taken off; and if there be new mole-hills raiſed or ant-hills, let them be cut down and levelled, and let the workman carry hay ſeed and ſome mould from the bottom of a hay ſtack with him: let him ſcatter on ſome ſeed wherever he has made the ground bare by cutting up theſe incumbrances, and ſtrew over it ſome of the hay ſtack mould; then treading it in with his feet, let him leave the reſt to nature. This will ſoon be the richeſt part of the ground.

Where the feet of heavy cattle have made holes in the moiſt ſurface, breaking through the turff; let the ground be rolled, and ſuch cattle be kept off in wet weather, during the remainder of the ſpring.

If a wheat ſtubble field have been plowed up after harveſt to prepare it for a crop of barley, it muſt be now well wrought again to prepare it for the laſt management in the next month, when the ſeed is to be put into the ground.

In this and all the plowings at the preſent cold ſeaſon, let the farmer regard the weather. A great deal of ſnow or heavy rains ſhould make him poſtpone this work at any time, three or four days, or more if requiſite; for it is not only inconvenient at thoſe times, but hurtful. The beſt of all is in a dry ſeaſon, when there has been a good deal of froſt; but the thaws have ſoftened the ground ſince. In that caſe the plow cuts eaſily, and no clod falls from the ſhare, but breaks and moulders to pieces as it falls: this makes the ground ready to receive the next influences of the ſun, air, rains and ſnows; and one well timed plowing of this kind will do as much as two that ſhall be performed at random.

This month ſow vetches of the ſeveral kinds: they will ſhoot quickly, and ſoon cover the ground. Once weeding when they firſt come up, will be required, and no more; after this they will take care of themſelves; and ſheltering the ground will, at the ſame time, prevent the growth of weeds, and mellow it all over. They root ſo lightly, that they exhauſt very little of the ſtrength of the mould; and they ſuffer nothing elſe to exhauſt it. The crop they yield is profitable, and the land is fit for a better after them.

This month run the horſehoe between the rows of ſaintfoin, lucerne, and the other large growing artificial graſſes. They are preparing for their ſpring ſhoot, and this practice will give them great vigour. If weeds be riſen among the young crops of them in the rows, it will be very proper to have them now pulled up by hand. As the crop grows at regular diſtances, this will be very eaſy; and it will not require to be repeated.

Where there is an opportunity to give the ground a ſecond plowing for oats, let it be done now. The farmer ſhould not grudge the expence of this when he ſows oats alone, for the return in the crop will abundantly pay the advance in charge. When clover is to be ſowed with the oats, it is abſolutely neceſſary to give this double plowing: and the firſt week in February is the beſt time for the ſecond plowing, and for getting the ſeed into the ground.

If the farmer find it convenient to change a piece of paſture land into tillage, this is a good ſeaſon for plowing it up for an oat crop. Let the four coultered plow be uſed: and after the work is well performed by it in the beginning of this month, the oats may be ſowed very ſucceſsfully at the end.

If there be a deſign of draining bogs or other wet land, this is a good time for beginning the work. It will be eaſy to ſee, after the wet of a winter, where the diſcharge moſt neceſſary, and where it may be beſt made, and the ground will now cut eaſily.

This improvement of land is ſo great; and when undertaken upon rational principles, is ſo eaſy, and ſo certain, that it is wonderful more of it is not done. In grounds that are only boggy from their ſituation, no more is neceſſary but draining, to put them upon a level with other land; in abſolute bogs, whoſe nature is not like that of common mould, the taſk is more tedious; but even theſe may be reduced to good, and the charge attending this is always worth while, becauſe the original value is little or nothing.

In the paſture and meadow grounds, if the ſoil be exhauſted, if it have been left unmanured, or from any other cauſe the farmer is afraid, he ſhall have but a poor crop of hay the ſucceeding ſummer. Let him now ſprinkle ſoot upon the ground; the rains will waſh it thoroughly in;

and the quantity, colour, and firmneſs of the ſhoot, will ſoon ſhew him that he has not miſemployed the expence of this dreſſing.

If any piece of paſture ground be over-run with moſs, firſt examine whether a lodgment of wet be not the cauſe, and if it be, remove it; then ſtrew on coal aſhes, and they will, at the ſame time, burn up the moſs and nouriſh the graſs.

If wheat, on a piece of dry ground, want refreſhment at this time of its growth, nothing gives it more ſpeedily than lime.

There is alſo another advantage, which is, that it deſtroys inſects. There is a ſmall vermin, which, at this ſeaſon, gnaws off the ſhoots of wheat juſt under the ſurface of the earth; and in ſome grounds it does great miſchief. It is chiefly in dry ſoils this creature lives, and for the ſame reaſon it is moſt hurtful in dry ſeaſons: wet kills it.

Lime, from a different cauſe, has the ſame effect; and I have ſeen a whole crop that was in danger from it, greatly recovered and abſolutely ſecured from farther miſchief by this practice. If rains follow the ſprinkling on of the lime, ſcarce one of theſe inſects in a million eſcapes death.

This is a ſeaſon at which farmers often turn in ſheep upon their wheat, and very properly ſometimes; but they do not manage this matter with ſufficient diſcretion. The advantage to the ſheep is very great, becauſe the food is excellent. It fattens weathers, and ſupplies the ewes with milk beyond any other food: this alſo is a ſeaſon when other foods are in a manner exhauſted, and therefore this is doubly valuable.

Theſe are the conſiderations which lead the farmer to the practice, and when this can be done without damage to the crop, they are very weighty and great ones. But that muſt be carefully called into the account. The propereſt wheat crops for this ſervice, are thoſe which have been ſown in September or October. Theſe have, in the very beginning of the preſent month, a tall and ſtrong ſhoot; and the danger is their running up too faſt, not their being late. This is prevented by eating them off, and it is attended with no danger or damage whatſoever. The ſheep eat only the uſeleſs leaves, theſe would fade of themſelves as the ſtalk ſhot a month or two afterwards, and it is better they ſhould feed ſo valuable a part of the ſtock.

The beſt ſoils and land that is moſt in heart, give the faireſt opportunities for this practice: for it is in ſuch only the wheat is in danger from growing too faſt: on the contrary, in land where the wheat grows ſlowly and weakly, this muſt by no means be allowed, for weeds will over power it before it ſhoots for the ſtalk after this eating. On the contrary, there riſe more and better ſtalks always after feeding in the proper lands.

Look over the hedges the beginning of this month, and thoſe which require plaiſhing ſhould now have that dreſſing. From ſeven to ten years is the time of growth which makes them want it; ſooner or later according to the ſoil and the ſhrubs.

If the farmer have a deſign of planting on any part of the ground, whether it be timber or fruit trees, this is a very good time for it. And to avoid the miſcarriages of others, which are more common in planting than in any other article, let him carefully regard the cautions we have given in the former volumes. Let him ſuit the trees to the ſoil, and never attempt to force nature to bear what is againſt her original courſe.

Let the trees be brought from a ſoil of the ſame kind with that, in which they are to be planted, but ſomewhat poorer. Let there be large holes opened for their reception, the mould well broken, and carefully laid in among the roots; and the tree not planted too deep. Let it be ſecured by a good ſtake, and defended from gnawing of cattle. In the trimming it, let regard be had to the ſhape it is intended finally to have, and neither let too much top be left nor cut it too cloſe. Moderation is the rule. He is very idle who ſuppoſes a tranſplanted tree can bear the ſame head it did before removal. But the common raſh uſe of the knife is as wrong as this. If ſufficient ſhoots be not left on to draw up the ſap, the courſe of vegetation is impeded, and this is as wrong as to leave on a quantity of boughs which muſt die.

Where ditching or any other kind of digging is going on, let the careful huſbandman overlook the work from time to time; and examine the earth which is thrown up: he may this way make diſcoveries that may enrich him. We have given the marks and characters of the various kinds of valuable earths, or ſubſtances found in the earth, and let him ſtrictly attend to them. Marle is more common than is ſuppoſed, it is to be had in a thouſand places, for any one wherein it is known; and the advantage of ſuch a diſcovery is very evident.

He will ſee, by theſe examinations, what earths he has upon the ground that can be ſerviceable for the improvement of others, and it is poſſible he may make more important diſcoveries.

In cutting drains for boggy ground, let him obſerve whether the earth under the ſurface be of the peat kind: if it be truly ſuch, he has the greateſt advantage in draining the bog, for the peat pays the charge.

In the yard let the good houſewiſe ſee to her early broods: they will require more of her care than thoſe which come at a warmer ſeaſon; but in this, as all other inſtances, where pains are rightly taken, the price of the thing much more than returns the charge and labour.

As the ſeaſon advances in warmth, the innumerable army of devourers of the inſect kind, will be riſing upon the farmer; but due care will deſtroy a vaſt many of them at this time. The good uſe of the roller in the plowed lands will cruſh them as they hatch, and a few days labour ſecure the crop for the ſummer. The beetle kind are firſt worms, and many of theſe are very deſtructive in tillage land. This ſeaſon brings them toward the ſurface of the ground, and they periſh under the weight of the roller like the ſlugs. The beſt time of the day is in the morning very early, for they are then upon the ſurface or cloſe under it. Afterwards they go deeper, and the roller paſſes over the place without hurting them.

The advantage to the crop from this practice is much more than the deſtroying of theſe vermin, for it preſſes the earth to the roots which the froſt had looſened.

Theſe are the advantages of rolling corn lands, and this is the time of doing it, for the ſame reaſon that it is the proper time of eating off the growth; becauſe it is a growth of leaves, ~~not~~ ſtalks; for in caſe the ſtalks were formed, and had any degree of firmneſs, the roller would break them, and they would very difficultly recover it.

THE
HUSBANDMAN'S KALENDAR.

MONTH THE THIRD.

MARCH.

IF a crop of wheat be intended yet to be put into the ground, the farmer muſt employ all poſſible attention to its growth, or he cannot expect it to be ripe in time. Nor is this all the hazard: from the very hour of committing it to the ground to its gathering, it is expoſed to more hazards than what is ſown at any other ſeaſon.

Theſe are reaſons why the farmer ſhould never, by choice, defer a wheat crop ſo late as March; but there are occaſions which may require it: for the accidents and circumſtances which may influence a particular perſon, are endleſs.

In this caſe the hope of ſucceſs will depend upon three things, the choice of ſeed, the manner of ſowing it, and the enriching of the ground while the crop is growing.

The ſeed wheat muſt be choſen from ſuch kinds as are ſhort in the ſtalk, that the land may have as little as poſſible to ſupply beſide the ear.

It muſt be ſown, if the common way of huſbandry be followed, in two-bout lands from the hand without harrowing afterwards, or under thorough, that is, to ſow it by broad caſts over all the land as ſoon as it is harrowed, and plow it in afterwards. Theſe are the true methods on good loamy ſoils; but where the ground is very light and brittle, it may very well be done with a narrow plow, throwing it by broad caſt and harrowing it in.

No corn is ſo much in danger to be devoured by birds, as wheat that is ſown at this time of the year: and in the common way of management theſe are the beſt methods of ſecuring it by the manner of ſowing. The drill huſbandry ſucceeds much better, and there are alſo other advantages very conſiderable which ſhould recommend this practice; but of theſe we ſhall ſpeak preſently.

Suppoſing it committed in the common way to the ground by either of theſe methods, the farmer muſt give it a good top dreſſing of the richeſt ingredients, to promote its ſhooting faſt and ſtrong, that it may, in ſome degree, get upon a level during the ſummer with that which was ſown in more favourable time.

In the drill method, where ſpaces are left for the horſehoe to come between, the ſeed lies ſecure, and there are opportunities of giving it continual ſupplies of nouriſhment. Every time the intervals are turned up by the hoe plow, a freſh fund of nouriſhment is given to the plants, and they ſhew it by a ſudden growth. This way it is eaſy to bring a crop of a proper kind of wheat ſown in March, to the ſame degree of forwardneſs by the end of ſummer, which thoſe have which were ſown in the common way naturally, and this is the only method in which it can be done with certainty. The hazards are too great in the other way, for the farmer's ever running the chance when he can avoid it.

Sow barley this month upon the ground we have directed to be prepared for it. If the ſoil be dry and not rich, the drill plow is always to be preferred on this occaſion. Hoeing is eaſy in theſe lands; and where only the common hand hoeing is intended, theſe rows laid regularly in by the drill, will give opportunity to doing it with the greateſt eaſe and advantage. But the true method is to drill the ſeed at ſuch diſtances, as to give room for the hoe plow in the intervals, which deſtroys weeds, and feeds the crop beyond all manures, and at a much leſs expence.

The ſecond week in March is a very good time for ſowing barley in low and ſomewhat moiſt grounds.

Oats may alſo be very properly ſown this month, and the later peaſe ſhould be put into the ground before the middle of March. The maple and union pea are of this kind, and ſhould never be put in ſooner than this.

The vetch kind and lentils may be ſown alſo this month with ſucceſs.

The firſt week in March, or if the ſeaſon be ſevere, the ſecond, are to be preferred to any other time for the ſowing of clover.

In wheat crops it may be very well ſowed at this ſeaſon, for the roller may yet be uſed ſucceſsfully; and this will preſs down the clover ſeed ſufficiently into the mould; and at the ſame time will lay it cloſer about the roots of the plants.

About the middle of March plow up the intervals of the ſaintfoine and lucerne grounds, which have been ſown by the drill for that purpoſe. This will clear the ground from the firſt ſhoots of weeds, and at the ſame time be furniſhing the crop with a freſh ſupply of nouriſhment.

Paſture ground will, this month, require a great deal of the huſbandman's regard. When he ſhall ſhut it up for hay is an article of importance; but the reaſons may be ſo different in various caſes, that no exact day can be named.

Let the ground be cleared from all ſorts of rubbiſh, and carefully and well rolled. This is a ſeaſon at which the roller has the greateſt advantages. The feet of cattle will have made ſome impreſſion, and the ants, moles, and worms will be throwing up, and raiſing, according to their various natures, hills and lumps of ſoil, ſuch as the farmer has, with ſo much care, before cleared away.

If the care, we have before directed, have been taken of the ground, the inequalities of this kind can be but new and ſmall, and in that caſe the uſe of a heavy roller is an excellent preſervation. The ground will now be mellow from the froſts and wet, from the ſnows and rains: it will therefore eaſily receive the impreſſion of the roller, and theſe new raiſed heaps of earth will be cruſhed flat at once. The ants will be deſtroyed in a great meaſure alſo by the operation, and theſe are the worſt of all this kind of vermin.

Let thiſtles, which now ſhew their large leaves, be drawn up with their roots. The condition of the ground alſo favours this; and the neceſſary treading upon the graſs in doing it, will produce no damage. If there be buſhes ſpringing up in any part near the hedges from the running roots of the ſhrubs, let theſe alſo be treated as weeds of the worſt kinds, and pulled up by the roots.

Brambles will take root at the ends of their branches, when theſe droop and touch the ground; and thus the hedge will be brought forward into the field to the great loſs of ground to the careleſs farmer. Theſe muſt be torn up as the reſt: all this ſhould be done juſt before the ling, and thus the whole ſpot will be clear and free for the growth of the hay; the ſurface will be level, and the mowers will be able to cut an inch cloſer to the ground than they would do if it had been neglected.

If the farmer would know the importance of this, let him compute what proportion an inch bears to the full growth of his graſs. He will find this is the addition of a very conſiderable quantity.

Turn and make up the dunghills, and other collections of manure and compoſt, add to them the cleanings of ditches, and the refuſe of the yard and garden; and from time to time throw up the liquor which runs from them all over the ſurface. The rains make a great deal of this drain off at the preſent ſeaſon, and it carries away, if ſuffered to run to waſte, a great part of the virtue of the manure. On the contrary, when it is thus from time to time thrown upon the heap, it aſſiſts, improves, and renews the fermentation.

There are two kinds of manure of great value, which are now in their higheſt ſtate of perfection. Theſe are ſea weed; and the ſpawn of ſhell fiſh. The ſpring winds drive them both in vaſt abundance to the ſhores, and up the mouths of rivers, and the farmer ſhould not miſs the opportunity of gathering them.

The ſpawn, and the more tender kind of ſea weed, are excellent for preſent uſe when a crop requires the aſſiſtance of a top dreſſing. They diſſolve eaſily with the rains, and the ſun has not yet power to exhale their virtue.

The other kinds of tougher weeds ſhould be made up into a heap with earth; or mixed in the common dunghills when they are turned at this time of the year; in either of which methods they make an excellent manure for autumn.

Among the top dreſſings that may be uſed to a weak crop at this time, old woollen rags come under conſideration, and they are of very great ſervice. No manure is more apt to loſe its virtue when laid on in a hot dry ſeaſon; becauſe a great deal of it is owing to the perſpiration of the people who have worn them; and this being of a volatile nature, is eaſily raiſed with the heat: at this time of the year there is uſually rain in abundance, and not much heat; therefore the ſaline parts diſſolve and are carried into the ground, giving a freſh ſtrength to the roots of the crop, juſt when they are about to make their moſt important ſhoot.

Hogs dung is another of the manures, which, for the ſame reaſon, ſucceeds excellent when ſprinkled over a crop at this time of the year. No dung is ſo looſe or light as this. The ſun and winds in dry ſeaſons preſently reduce it in a manner to chaff; and the virtue is loſt: but at this ſeaſon, this light part, in which conſiſts its value, is not evaporated, but waſhed into the ground.

The farmer who has bank fences, muſt now look to them with care. The froſts and the ſucceeding rains have mouldered and waſhed them away in ſome places; and often the blowing down of a ſtump, or the tearing up by boys, will have taken away a piece of the bank with it. This is the ſeaſon in which the repair is moſt eaſy: the ground cuts freely with the ſpade, and yet has ſo much thorough moiſture, that when ſtruck with it upon the bank, it will get into a firm and tough ſubſtance, adhering together cloſely. Labour is leſs required now than at many other ſeaſons, and this is a condition of the ground that ſhould not be neglected, for this is the eaſieſt time of performing it as well as the moſt natural and convenient.

THE
HUSBANDMAN'S KALENDAR.

MONTH THE FOURTH.

APRIL.

THE ſeaſon now comes on when the crops of all kinds will be making their greateſt advances in growth; and the farmer muſt be aware that weeds will grow with the ſame vigour among them. Indeed with more, for they are the natural produce of the ſoil; the others, in a great meaſure, artificial.

Weeding is now a moſt eſſential article, and that farmer is happieſt, whoſe crops are ſo diſpoſed, that it can be done moſt eaſily and advantageouſly. Here the drill and horſehoeing huſbandry ſhew their value.

The regularity of diſpoſition in thoſe methods, admits the labourer's courſe in deſtroying theſe incumbrances of the ground without interruption; or damage to the proper growth.

In all drilled crops, which have ſmall intervals, let the ground be cleared by the hand hoe; and in thoſe where the horſehoe can come in, let the intervals be well broke and turned up by that inſtrument.

Many let the weeds get ſome growth before they deſtroy them, and, in the common courſe of huſbandry, it muſt be ſo for many reaſons; but all the time they are taking that growth they are exhauſting the crop, and it is at a ſeaſon when this is moſt hurtful of all: on the contrary, when weeds are deſtroyed by this early care, by the hand or horſehoe, the crop is cleared before theſe intruders can have got any great quantity of nouriſhment from the ground; and the ſame operation prepares the earth for giving the plants freſh, free, and abundant nouriſhment.

In crops of wheat raiſed in the common way of huſbandry, where the ground is very full of weeds, it will be neceſſary this month to clear them away, but vaſt care muſt be taken that the corn is not trampled down at the ſame time.

This is all the direction that can have place with regard to a wheat crop; for it is too late now to ſow it. But there are many other kinds which may properly be now put into the ground.

Barley may be ſown this month with great advantage. In general the dry, warm and rich ſoils ſhould now be ſown with it, and the others the foregoing month.

Sow oats the ſecond week in April; and according to the weather, blue peaſe the ſecond or the third.

In tough ſoils, provided they lie dry, barley may be very profitably ſown in April; but it muſt be firſt ſteeped in ſome of the mixtures already directed for this purpoſe; and the beſt method is by the drill and horſehoeing huſbandry, becauſe in that manner the ground may be broke by tillage while the crop is growing. Many are deterred from ſowing barley at this ſeaſon for this reaſon; but they have nothing to fear from the nature of the ſoil, if they will take the precaution of uſing this method of huſbandry.

Some care ſhould be alſo taken in the choice of the ſeed corn for theſe improper ſoils. That which has grown upon a crumbly loam, ſucceeds beſt upon theſe grounds.

The ground ſhould be always well enriched for this crop, for barley will come to good when it ſtands very thick; provided the ground have been in good heart for it.

Sow white oats this month: and according to the purpoſe of the land afterwards, let this crop be put into the ground alone or with clover ſeed, or the ſeed of ſome of the other artificial graſſes.

Sow the latter kind of peaſe as long as to the end of this month. Thoſe which are put ſo late into the ground will often ſucceed better than ſuch as have been ventured early: peaſe are a crop that are frequently injured by cold; and theſe, which are ſown when the great danger from that is over, often overtake ſuch as were nipped after their firſt ſhooting.

The drill plow is the beſt convenience that ever was invented for regular ſowing, but care muſt be taken in the uſe of it on this occaſion, otherwiſe the old method is better. As the drill is a regular machine, the ſeeds which are ſown from it muſt be alſo regular. This is the caſe of moſt kinds, but peaſe and beans often differ in ſhape and ſize ſo much, as to obſtruct the regular diſcharge of them. The ſeed muſt be looked over and ſorted for this purpoſe, and it will then come as regularly from this plow as the wheat or other corn.

Vetches may yet be ſown: but let the farmer chuſe the right kinds; we have given him the diſtinction between the ſeveral varieties in the preceding part of this work; and he muſt attend to them if he would aſſure himſelf of ſucceſs. In moſt crops we prefer the drill and horſehoeing method: but more is to be conſidered in theſe than the produce of the plants, they are to improve the ground as well as to afford the crop. The improvement they give is owing to their ſlight rooting, and the ſpreading of their ſtalks which cover and ſhelter the whole ground, and conſequently prevent the growth of weeds, and give a lightneſs and mellowneſs to the ſoil. For this purpoſe they are beſt ſown at random all over the ground, for if in drills with intervals, although the vetches will be better, a part of the ground will be uncovered and will want the advantage.

When vetches are raiſed for producing ſeed, or for the abſolute uſe of the plants themſelves, the ſowing by drill is vaſtly preferable; but when there is the farther advantage expected of mellowing the ground, let them, by all means, be ſcattered in the old method.

The ground, intended for turneps, ſhould now be plowed up well and thoroughly, to break its particles, reduce them to a proper degree of fineneſs, and give them the impregnation of the air, dews, ſun and rain. The neglect of this needful tillage, at the preſent time, leaves the ground to be exhauſted by the ſpring weeds: and conſequently the plowing has a double advantage; as it at once deſtroys theſe, and prepares it for receiving all the benefit from the air.

The laſt week in this month is a very good time for ſowing turneps for prime uſe in July. If rains follow, there will be no great fear of ſucceſs: but let the farmer always ſow old and new ſeed together, becauſe it comes up at a few days diſtance, and one of the crops may ſucceed, though the other ſhould be devoured by that terrible enemy the fly.

It is a practice with many, who ſow their turnep ſeed in drills, to ſow peaſe in the middle of the intervals. This they do by way of getting two crops from the ſame ground, but all that is ſaved is not got. One of the crops, which had the fair advantage of the ſoil, would be worth the two; and the ground is exhauſted, which, in the other caſe, would have been recovering itſelf in the intervals while it was feeding the rows.

The kitchen gardeners about London taught them this, and even among them it does not anſwer ſo well as they imagine; the great rent of ground near London, and the expence of the vaſt quantity of manure they lay on, makes it neceſſary they ſhould make the moſt of every inch of the land, but though the richneſs they give it makes the double crops thrive tolerably, they always hurt one another; and if this be the caſe in the garden, there is no doubt but it will be much more ſo in the field, where the dreſſings cannot be ſuppoſed to be ſo perfect, either with reſpect to quantity of manure or tillage, or where the extream price of the ground cannot make it neceſſary.

Let the farmer remember what we have ſaid, and what experience ſhews with regard to the produce of land from the drill and horſehoeing huſbandry. The ſmall number of plants upon the ground, is one cauſe of the vaſt ſucceſs of this practice. This may teach him, that not the number of plants make the greatneſs of the crop, but their good nouriſhment. One plant, which has free air and full ſoil, will produce much more than a crowd of ſtarved ones upon the ſame ſpot.

Plow up the land that is to be ſown with wheat in the following autumn: break it well, and throw it up in ridges, that it may have the benefit of the ſpring rains, and the ſucceeding ſummer's air.

If it be neglected now, the rains will run off which ſhould enrich it; and the weeds of the ſpring, which are various and innumerable, will exhauſt it as much as a common crop.

Plow up the land that is deſigned for rape. The ſtiffer the ſoil is, the more plowings it will require; and the tillage muſt be repeated at times till the middle of July, when the ſeed may be ſown; and the plants will get ſuch root as to ſtand, without hazard, the winter's ſeverity.

The roller may now be brought over thoſe crops, which are not of ſuch growth as to ſuffer by its breaking their ſtalks. When they come to this condition, it cannot be uſed without damage: now it will kill the common devourers, and greatly aſſiſt the crop. Peaſe will get great advantage from this method. The naked ſnail is now making its havock among them, and it will be deſtroyed by morning rollings, and its very fleſh waſhed into the ground, will aſſiſt the growth of the crop it would have otherwiſe devoured.

Continue the roller upon thoſe graſs grounds which have not yet had the benefit of it; and when this is done, ſhut them up for hay.

If hedges, which require plaiſhing, have been let alone till this time, the ſeaſon alone can determine whether it may or may not be done now.

If the ſap be ſo far riſen, that the bark ſits looſe upon the wood, and will ſtart away from it on bending down the boughs, it muſt, in that caſe, be let alone till the next ſeaſon; but if, upon trial, the ſtuff is found to bear it, the work may be conveniently enough done now.

Plant quick, where it is wanted; look over the plantations of coppice wood, and prepare them for taking the ſummer growth to advantage. If the plants ſtand any where too thick, pull up a few and plant them where there are vacancies. In the damp parts of the ground, where the common growth is moſt apt to fail, thruſt in ſallow truncheons at proper diſtances, to make up the deficience: they will now grow freely, and ſoon be upon a level with the reſt. Where the defect is greater, lay down a ſhoot from ſome of the next plants, faſtening it in, and covering it three inches with mould. Leave a foot of the top out, and there will ſoon be a growth to ſupply the gap.

This done, if any riſe ill ſhaped, cut them down within four inches of the ground, and leave them to make new ſhoots. Pull up any large rooted weeds, and laſtly, make good the fences. Thus leave all to nature.

THE

HUSBANDMAN'S KALENDAR.

MONTH THE FIFTH.

MAY.

THE land that is intended for ſowing with wheat in September, if it have not yet been turned up in the fallow, will require to be well wrought now. Earlier in the ſeaſon is better; and the laſt month is the very beſt of the year, becauſe the air is then fully impregnated with thoſe particles, which give fertility: but if it have been omitted then, the beſt time is the beginning of the preſent month.

After this it muſt be turned up as often as the weeds appear of any growth upon it: otherwiſe the farmer is enriching with one hand, and leaving the ſoil to be impoveriſhed from the other.

The ſame tillage which deſtroys the weeds improves the ſoil; and according to the nature of the ground, and the intent of ſowing in the common or drill method, more or leſs manure is to be uſed.

In corn that is now growing, the drill and horſehoeing huſbandry alone can do any ſervice. If wheat have been managed in that manner, this is a good ſeaſon for plowing up the intervals; and the hoe plow may come a great deal nearer the rows of corn than it could be brought when it was younger, and the danger greater from froſts.

This plowing up the intervals never fails to promote the growth in a very great degree; and where the wheat is pooreſt, it is, for that reaſon, moſt neceſſary.

On the other hand, in crops, ſown according to the common practice, nothing can be done to refreſh and forward the growth, but a top dreſſing of ſome of the warm manures.

The beginning of the month is the proper time for it, and if the weather promiſe to be ſhowery, it is ſo much the better. The farmer ſhould wait a few days, though the ſeaſon be advanced, for that advantage: the ſun has power in May; and theſe manures, when ſcattered on where they cannot be plowed in, will ſoon waſte their virtue unprofitably, if it ſhine upon them.

Barley may be ſown this month, but the preceding is better. However, as there may be many occaſions that lay the farmer under a neceſſity of doing it; let him take care to chuſe a right kind of ſeed. If turneps have not been eaten off in time, it may be neceſſary now to ſow barley, which otherwiſe it would have been better to put in earlier, or if the ground have not been got ready in better time, this ſeaſon, with proper care, will do.

The land muſt be brought to a great fineneſs, and the proper barley is the Rath-ripe or Fulham kind. This muſt be ſteeped before ſowing; and I have been told by thoſe, who have experience, that the method of diſſolving the ſalts in a decoction of barley inſtead of common water, has great advantages on this occaſion.

The method is to boil a quantity of good barley in as much water as will be neceſſary to make the ſteeping liquor; and when it has been half an hour burſt, the liquor is to be ſtrained off.

The barley is not entirely waſted in this caſe, for it will feed any of the fowls in the yard; and in the liquor the ſalts are to be diſſolved.

The drill plow is beſt for ſowing it, but it muſt be well limed firſt, that it may run freely through. In this way the great aſſiſtance it receives from the ſteeping, and the good condition of the ground, together with the nature of this kind of barley, famous for its quick growth, will produce the crop in time, even from this late ſowing.

If the nature of the land, and a favourable ſeaſon join to allow the practice of folding upon the new ſown barley ground, it will be of great advantage. Every thing ſhould be done that can contribute to quicken the growth of this crop, and the dung and urine of ſheep have this plain advantage; but if the ſoil be ſtiff, or the ſeaſon very wet, it cannot be done: in theſe caſes, the trampling of the ſheep does more harm than their manure can do good; it hardens a tough ſoil, and it poaches any ground in very rainy weather. In the firſt of theſe caſes, the young ſhoot of the corn cannot get out of the ground; and in the other, it lets the wet into holes, which deſtroys it. When the land is of a light and looſe nature, and the weather is fair and dry, fold ſheep upon the ground as ſoon as the barley is ſown at this advanced ſeaſon; they mend the ſoil by treading, for they make it the more firm; and their dung and urine falls on at the time when the firſt growth is to be made, which it greatly forwards and ſtrengthens.

Worms are often dangerous to the barley, which is ſown at this ſeaſon: it will be perceived by the fading of many of the firſt ſhoots, for the worms eat them juſt under the ſurface. Lime is the beſt remedy: it ſhould be ſcattered freely over the ſurface, where this danger is ſeen, and it will either deſtroy or drive the worms deeper down, and at the ſame time promote the growth of the crop.

Saintfoine may be ſown with barley this month; but the ground muſt be well enriched for this purpoſe. A dreſſing of ſoot is preferable to any thing elſe; and the folding of ſheep on the land, as ſoon as ſown, is as uſeful for the graſs as the grain.

If ſhowers follow, the ſheep muſt be taken off, but the ſaintfoin will thrive vaſtly the better for ſo much weting.

Turneps may be ſown this month for the ſervice of the latter part of ſummer; whether it be by feeding with ſheep, in order to prepare the ground for wheat, or for ſale, in the beginning of autumn. In theſe caſes, a May ſown crop will anſwer very well: but the farmer muſt not let theſe ſtand for winter.

Buck wheat may alſo be ſown about the middle of this month with advantage.

Sow dyers weed or weld this month, and it will come to perfection in good time.

The oat crops are frequently in danger at this time from charlock, a weed that reſembles muſtard. The common method is a very imperfect one of managing it; they cut off the tops with hooks, and leave the root, and the reſt of the plant growing.

This does ſome ſervice; but the beſt method is to get it up by hand. This is chargeable, but the crop will anſwer it. When there is ſuch a vaſt quantity, the produce of the oat cannot be expected to be tolerable; and the price that is paid for pulling up the weed, will be many times over paid by the advantage in the harveſt.

Clover may be very well ſown yet, for few ſeeds come up ſo ſoon. If the weather be favourable, eight days will bring it out of the ground. Care muſt be taken to chuſe freſh and good ſeed; and the beſt way of covering it is by a buſh harrow.

In the fields where the other artificial graſſes are eſtabliſhed, let the farmer watch the time of the firſt mowing, if they be ſown in the new huſbandry, ſo as to admit the horſehoe; and this have been uſed in the beginning of the month in forward ſoils, and favourable ſeaſons, they will ſhew the buds for flowering, which is the mark for cutting the firſt crop, toward the end.

The cutting theſe plants upon their firſt maturity, is a very great article in the farmer's concern; for it prevents them from exhauſting themſelves at the root, and it makes way for the growth of a new crop.

Where lucerne has been ſowed in the beginning of March, it will be neceſſary now to weed the ground very carefully. Theſe plants are eaſily overpowered by weeds at firſt; but after they are eſtabliſhed in the ground, there is little danger. If the lucerne be raiſed in rows, with intervals for the horſehoe, the work is eaſy; if otherwiſe, the handhoe muſt be uſed. In either caſe, this laſt inſtrument is wanted to weed between plant and plant in the rows.

Of all weeds in the lucerne ground, beware of graſs. Tear this up on its firſt appearance; for where it gets footing, the crop will never come to good.

THE

HUSBANDMAN's KALENDAR.

MONTH THE SIXTH.

JUNE.

THE land intended for wheat in autumn, muſt be continued in a perfect fallow, and no weeds ſuffered to grow on it, nor the ſurface to grow hard by reſt. In either of theſe caſes, a great part of the benefit of the fallow will be loſt. Weeds will draw the nouriſhment out of it, which ſhould be reſerved for the corn; and the hardneſs of the ſurface will prevent its receiving the impregnation of rains and dews, as is the intent of the fallow.

The wheat fields ſown in the uſual way, muſt now take their chance; for no ſervice can be done them, if they want it ever ſo much: the ſtalks are ſo far grown, that the field muſt be left at reſt, for they would not recover the damage they ſhould receive by the feet of weeders.

In the horſehoeing huſbandry it is otherwiſe. An unfavourable ſeaſon will often make wheat require help in its growth in June; and the fullneſs of the ear will in a great meaſure depend upon it. This may be given by the hoe-plow, which turning up the intervals, and breaking the ſoil at the ſame time, deſtroys weeds, and furniſhes nouriſhment.

Where the land is of a particular nature, or has been in particular crops before, and is now in fallow for the autumn ſowing of wheat, the farmer muſt manage it accordingly. Where the ground has been plowed in broad land, from oat or peas ſtubble acroſs, it will be neceſſary now to turn it up croſsways.

In the growing crops of this valuable corn, let the farmer watch that no accident happen; it will be now in the tender ear, and conſequently in danger of mildews, and many other accidents. What can be done to prevent or remedy theſe accidents, we have explained at large under the proper heads; but the advice is of little uſe, that comes after the miſchief is paſt; therefore let the care be taken now, to ſee the firſt approaches of theſe accidents, and apply the remedy in time.

If the late ſown barley look weak and yellow, let ſome ſoot and pigeons dung be yet thrown on; taking the advantage of approaching rains, it will change the aſpect of the field immediately, and the growth will be refreſhed in ſuch a manner, as that the former danger will be forgot.

The fields of oats will be now in danger from the tall growth of weeds; and the care directed in the laſt month, muſt be repeated in this, to deſtroy, or at leaſt to reduce that inordinate growth, by which they will otherwiſe choak the crop, while they are at the ſame time exhauſting it.

Sheer ſheep the ſecond week in June; and take care they be firſt well waſhed and dried. The wool will be of conſiderably more value for being clean; and let the care of the ſheep be the next conſideration. A careleſs ſhearer will wound them; and the conſequence of this is, flies blowing them, and worms breeding in their fleſh, which torment them, and often reduce their value greatly.

In the beginning of this month, look carefully over all graſs grounds. Examine the ſtate of the crop in each field, and conſider the time of mowing. This is a care too much neglected, and the farmer loſes by that neglect a great part of his profit. The value of the hay depends, in a great meaſure, upon cutting it at proper age; and the abſolute quantity for it is ſold by weight. Hay which has outgrown itſelf, weighs much leſs than ſuch as has been cut when in perfection. All plants are moſt full of vigour when they are grown to the ſtate of flowering, but have not yet opened their bloom. The graſſes are of various kinds in the ſame fields; and they will not all flower juſt together, but there will be a middle time to be choſen, when the generality are in their greateſt perfection. The true time is, when the buds are all formed, and ſome few have opened and huug out thoſe white feathery threads, which are the moſt conſpicuous part of their flowers.

At this period the ſtalk of the graſs is freſh and juicy to the bottom; and the lower leaves are plump and green. The juice is not only full in them at this period of growth, but it is rich, and in the higheſt degree of perfection.

If the graſs be cut at an earlier time than this, the ſtalk, though full of juice, loſes a great part of it in drying, becauſe it is watery, and evaporates quickly; whereas the hay which is made from graſs cut at proper ripeneſs, loſes proportionably very little.

When, on the other hand, graſs is ſuffered to ſtand a great while before it is cut, after it has attained the due ripeneſs, the ſtalk grows yellow, and fades at the bottom; the lower leaves decay, and thoſe above become light and dry. Nothing is in good condition but the ear, which is not what is regarded in hay; and therefore it is always a loſs to feed it at the expence of the reſt.

The proper time being thus watched for cutting, let the farmer follow the mowers in their work, to make them cut cloſe; and that they may be able to perform it well, let him examine their inſtruments. The ſcythe ſhould be notched rather than turned upon the edge, and the edge itſelf ſhould not run perfectly ſtrait, but in a waved line. It is the property of good ſteel, when joined to iron, to run thus; and where the edge is quite ſtrait, it is a proof the metal was bad.

The quantity of manure that has been laid upon the ground, promotes the early ripening of the graſs; and alſo the growth of a ſecond crop. In proportion as this is to be had in abundance, or not, the farmer ſhould expect a ſecond crop of hay, or prepare for feeding upon the growth, which comes after the mowing.

When a ſecond crop is expected, the firſt ſhould be cut ſomewhat the earlier; and the ſame caution in cutting cloſe may be obſerved in this, as when the latter growth is for feeding only. For though it is the great article to get the ſecond crop ready in time, yet the cutting low does not prevent, but rather promote it: for the ſecond growth is all freſh ſhoots, and the leſs is left of the old ſtumps, the more readily the new ſhoot is made.

The hay, in this caſe, ſhould alſo be got as quick as may be off the ground, that the advantage of free air and ſun may be had for the crop.

In the northern counties, they mow by what they call loping in. This is by cutting with a ſwing from the right, after raiſing the ſcythe a foot and half. This is an irregular and uneven way of cutting. They tell the owner, that if they don't cut low enough at firſt, they come with a ſecond ſtroke: but this does not anſwer his purpoſe; for what they cut thus at the ſecond time is ſo ſhort, that it is not taken up by the rake, and conſequently it is not added to the quantity of hay. The farmer ſhould not admit theſe excuſes, nor this way of cutting.

The mowing with ſhort ſtrokes has alſo great diſadvantage; the graſs is irregularly cut, and a great deal of it is left too high, as may be ſeen in the ſweeps and ridges, after ſuch mowing: this and the other way are both eaſier to the mower than the true deep even cut; but the farmer ſuffers: he ſhould ſee firſt that their ſcythes are good, and then that they make all their ſtrokes in an even ſweep, large and cloſe to the ground. There is no doing this, unleſs the ſcythe itſelf be good: frequent whetting of a bad one, only makes it worſe, and the bad edge of this inſtrument is always to the farmer's diſadvantage.

The hanging of the ſcythe is a great article for the eaſe of the mower; if it be hung narrow, there muſt go more ſtrokes to the ſame work; and when duly wide and flat hung, it does the buſineſs beſt of all, as well as moſt eaſily.

The making the hay we have directed at large; with regard to ſtacking it, there is one caution of importance which is too often neglected. The farmer forgets that rains come moſt with a ſouth wind, and leaving the hay as much expoſed to that quarter, as to the others, he finds it afterwards conſiderably damaged there, while it is ſouud in every other part. Let him take care to defend it, particularly where the danger is: let the ſtacks always have their end toward the ſouth; and in making it up, let the middle always be kept higheſt, the wet will by this means be naturally thrown off.

When a crop of any of the artificial graſſes has been cut, let the farmer throw on a little light and rich manure, by way of top-dreſſing, when they are ſown in the common way; and if in the horſehoeing method, let the intervals be plowed immediately after the crop is off. The reaſon of both practices is the ſame, that a quick and vigorous ſhoot may be made for the new growth; and it is ſeen by repeated experience, that the plowing up the intervals in the new huſbandry, anſwers this purpoſe, juſt as well as the manure in the old.

When ground is intended to be ſown with any of theſe in autumn, let it be well plowed now, and the clods carefully broke; theſe ſeeds require a fine and freſh mould, and this ſummer fallowing gives both thoſe qualities.

If weeds have got footing among ſaintfoin, when ſown in the common way, let them be carefully pulled up at this ſeaſon; and let the farmer, particularly in his lucerne field, beware of graſs. He muſt deſtroy the firſt ſhoots of it, or he will loſe his crop.

Where the corn or oats are over-run with tall weeds, thiſtles, ſow thiſtles, and the like, let the mower at odd times go in, and cut off all the heads of them. A few ſtrokes of the ſcythe do this without damaging the crop; and the conſequence is very beneficial, for this is the ſeaſon when they would be ripening their ſeeds, and the cutting away the heads prevents a vaſt deal of their natural produce for the next ſeaſon.

The crop alſo has its advantage from this particular time of doing it. All weeds exhauſt ground moſt, when they are of the largeſt growth; and moſt of all, when they are about forming of their flowers and ſeeds. This is a time at which nature is buſieſt in her operations; and the crop, as well as his waſte produce, being now in that ſtate, there is great advantage in cutting off the one, to give the full ſupply to the other.

The crops of turneps ſhould now be watched from time to time; and wherever it is poſſible, if the weather be dry; they ſhould be refreſhed with a little water. If they eſcape the fly at their firſt ſhooting, and the effects of a violent drought afterwards, till they have ſome ſtrength, they will then defend themſelves from weeds, and be in no danger.

THE HUSBANDMAN'S KALENDAR.

MONTH THE SEVENTH.

JULY.

CONTINUE the fallowing of the land intended for autumn ſowing with wheat. The more it is broke by tillage, the better it will feed the crop. Clayey ſoils receive a particular advantage from being turned up at this time, and eſpecially where ſand or ſandy loams have been uſed as the manure. The fault of theſe ſoils is their toughneſs and coldneſs, and theſe are very happily amended at this time, by turning them up with ſuch ingredients mixed among them; for the ſun calcines the clay, and the ſand, at the ſame time that it divides, warms alſo the ground. This is all that is wanted to bring clay to be one of the beſt ſoils in the world, warmth, and a diviſion of the parts. The farmer who lays on ſand for this purpoſe, is ſure to do right; but he expects the advantage in vain, unleſs he gives alſo the frequent and full tillage. Sand is a good inſtrument; and the chipings of warm ſtone, which we have recommended on this occaſion, are yet better; but neither of theſe can operate, unleſs the farmer aſſiſts by breaking the ſoil, and mixing theſe among it by tillage; and expoſing it at various times, and in different forms, to the ſun, air, and rains.

In wheat fields, where the crop is growing, weeds are now very miſchievous: all the nouriſhment they draw for themſelves is loſt to the crop, and the farmer will have lighter ears, in proportion to the number of theſe. They muſt therefore be deſtroyed if poſſible. In the new huſbandry this is eaſy; and the hoe-plow, at the ſame time it does this ſervice, gives a new ſource of nouriſhment to the crop. In the common huſbandry it is difficult, but ſtill ſomething ſhould be done; and according to the form of the land, and manner of plowing, more or leſs may in different places.

Let a labourer walk through the furrows with a pea-hook in his hand: let him pull up by the roots ſuch tall weeds, as he can reach with his hand; and cut off the heads of the reſt.

He is not to attempt to deſtroy the ſmall plants; ſuch as pimpernel and allheal, and ſnap dragon and corn crowfoot: theſe do much leſs miſchief in their humble growth, than the charlock which lifts its head above the corn; and the ſow thiſtles, and thiſtles of the common kind, which often are doubly of its ſtature, and are all full of a milky, or other thick juice.

Theſe may be deſtroyed in leſs time than one would think; and the others will do little harm in proportion. Laſt year I ſaw a wheat field in Buckinghamſhire, which partly from the nature of the ground, and partly from ill management, was ſo covered with weeds of this kind in the beginning of July, that the owner, who was not a farmer, but a gentleman who kept a little land in his hands, gave it up as a crop from which he had little or no expectations. At my advice he ſent in a couple of weeders, who walking up and down the furrows, took every land between them, and two days finiſhed the work, though it was no ſmall field. The conſequence was ſurpriſing; for it happened that every thing favoured. The corn which had before been as it were buried under this incumbrance of weeds, ſhewed itſelf better than was imagined, when cleared of them, and ſome rain following, the ears filled, and the crop was not inconſiderable. I doubt not but he put into his pocket two thouſand per cent. advantage upon the price of this weeding. This is the farmer's proper way of judging. If he grudges a good weeding, becauſe it will coſt him a few ſhillings, let him be told his crop will be as many pounds better, as he lays out ſhillings on this occaſion, and he will be induced to try once: he will be taught by the effect to manage in the ſame manner always. This is a neceſſary leſſon; for wheat fields ſuffer greatly for want of this aſſiſtance. One ſuch example ought to animate many to the improvement.

Look over the barley, and ſee how it riſes; where it is in good order, and in what part it needs aſſiſtance. If the ground have been prepared with the care we have directed, there will be no need of help to it now: and if there have been neglect in any of theſe articles, the relief is difficult in the common way of huſbandry. The two accidents that may hurt crops at this ſeaſon, are weeds, and want of nouriſhment. In the common courſe of the farmer's buſineſs, the weeds can be but very aukwardly and difficultly deſtroyed, as we have ſeen in a late inſtance; and at this period of the growth, it is ſcarce poſſible to give any aſſiſtance in regard to nouriſhment. This ſhould ſtrongly recommend the horſehoeing huſbandry, for in that it is only ſending in the hoeplow, and both theſe purpoſes are anſwered at once. The weeds are all torn up, and the ſoil by tillage is enriched, as if it had been dreſſed with the moſt excellent manure.

Where the ground is very much encumbered with weeds, it will be beſt in this kind of tillage, firſt to ſend in weeders to pull up by hand the worſt of thoſe, which grow among the corn in the rows; they may throw theſe as they pull them up into the intervals, and the hoeplow coming in afterwards, will bury them with the reſt. The weeders for this purpoſe ſhould be always ſent in before the plow, becauſe their trampling would otherwiſe hurt the lightneſs of the ground from the tillage.

Wheat toward the end of this month, is expoſed to danger of two kinds from inſects and from birds. The latter are the moſt readily ſeen, and therefore the damage from them is eaſieſt prevented; the farmer often knows nothing of the others, but by the damage he ſees follow them. It is then too late for remedy, we ſhall give him timely advice.

The corn is now growing to its ſize in the ear, and is yet ſoft and tender: inſects find their way eaſily into it, and lodge their eggs there; the produce of which feed upon the very ſubſtance of the grain, and ſpoil the part which they do not devour. No care can be too great in guarding againſt this; and conſequently no watch too ſtrict to find the firſt appearance of the danger.

The fly which takes the wheat juſt after the time of its ſetting for grain, is ſmall and black; it is about the bigneſs of the head of a large pin. They faſten upon the ear in vaſt number, and preſently eat their way into the body of the corn, where they lay their eggs. From theſe are hatched ſmall maggots, which devour a part of the flour, and ſpoil the reſt.

When theſe flies come they generally are numerous, and a crop is often reduced greatly in its value by them; and ſometimes, in a manner, ſpoiled entirely.

The farmer muſt look to his corn when the fly is likely to attack it; for it is in vain to attempt a remedy afterwards. He may diſlodge the flies while they crawl upon the ear, and they are ſo tender, that a very little force deſtroys them: the eggs he can never get out or diſlodge.

How he may beſt attack the flies, nature ſhews him. They appear moſt in dry years; for when there fall rains in any great quantity, they are waſhed off and deſtroyed.

In the dry ſeaſons there are dews, and the farmer may take the advantage of them for this uſeful purpoſe.

Let him ſend in a couple of labourers with a cord, that will reach from furrow to furrow, and treat the crop, while wet with dew, as we have directed, againſt ſome other accidents. Let the cord be ſtretched acroſs the land, and one of the labourers walking in each furrow; let them draw the cord gently and carefully over the corn, while it is yet wet with the dew. The flies will by this means be bruſhed off and deſtroyed. But it is eſſential that this be done ſoon after their firſt appearance, for otherwiſe their deſtruction anſwers no purpoſe. It is not the flies which do this miſchief, and if they have laid their eggs in the grain, the killing them anſwers no purpoſe. It is for this reaſon we have adviſed the early and careful watching of the corn; for it is eaſy to prevent the miſchief which it would be impoſſible to cure.

The other danger from birds comes on in its full force at the end of the preſent month; and they are ſo eager, that they will, if not prevented, often devour a great part of the produce. Pigeons are very miſchievous at this time, and many of the wild birds. They firſt ſettle openly upon the crop; the others creep about the edges of the field, where there is ſhelter of hedges; and as the corn now is juſt between hard and ſoft, it tempts them greatly, and is eaſily devoured.

Many methods have been propoſed for driving them off, but nothing anſwers well except the gun; nor is any ſcare-crow ſo effectual, as the birds of the ſame kind that have been ſhot, hung up by the tip of the wing to a pliant bough.

Theſe creatures are cunning; and when there has been miſchief done among them, they are eaſily frighted. This way and no other the corn can be preſerved. As the farmer knows that it is about the hedges they moſt prey upon him; let him beſtow his chief care there.

The fly which attacks turneps in the early period of their growth, is never more dangerous than at this ſeaſon, becauſe the weather is naturally hot and dry. There is a prevention at the time of ſowing, which is to mix flour of brimſtone with the ſeed ſome days before it is put into the ground. The damage from the fly is in itſelf ſo uncertain, that it is hard to ſay when any prevention has or has not been ſucceſsful; but the generality of farmers believe this is of great uſe: the beſt quantity is an ounce of the flour of brimſtone to every pound of the ſeed.

When the fly is upon the plants, the moſt probable reſource is burning of orpiment. It is wonderful how vaſt a quantity of ſmoak, and how offenſive a ſmall piece of orpiment will raiſe. A charcoal fire ſhould be made in ſome part of the field, from whence the wind carries the ſmoak all over it; and a few pieces of orpiment are to be thrown in at times. They will fill the air with a white thick foggy ſmoak, and this will often ſuffocate the flies. It does no hurt to the turneps.

In fields where the turneps have been ſown early, and have eſcaped this danger in their firſt growth, they muſt be hoed when they have a little ſtrength. This is neceſſary, partly to clear the ground of weeds, and partly to thin the crop. The plants ſhould be cleared to about ſeven inches diſtance, and according to their intended uſe they may be thinned farther in the ſucceeding hoeing.

Turneps, though a very profitable crop, and a very ſafe one if proper care be taken, may eaſily diſappoint the farmer, who has not given them the due advantages. Theſe are good tillage; and a proper heart in the ground, due diſtance, and a clear ſpace, not encumbered by weeds between.

The horſehoeing huſbandry produces the largeſt turneps, but they ſucceed very well the common way.

The firſt week in July is very proper for the ſowing of coleſeed; and the farmer who has land of a right kind, will find this an extreamly profitable crop. It will thrive very well on ſuch ground as is too moiſt for the generality of his crops, and will make him a very good return. But in order to obtain theſe advantages, he muſt allow it a due care and attention. The coleſeed plant is more of the nature of a garden than a field herb, and muſt be managed well, eſpecially while young. The ſowing at this time is a material article, becauſe its ſucceſs will in a great meaſure depend upon its getting good root before the winter. And after this it muſt be kept clear from weeds like a garden crop, and the growth properly thinned. The ſlug purſues it in the ſame manner as it does the common kitchen garden herbs; and after the plant has eſcaped, or got over this danger while young, the caterpillar is as miſchievous a devourer for a great part of its growth.

The moiſter the land is, the more danger there is of the ſlug, for it cannot live in ſandy, or other warm and dry grounds: therefore the more wet there is in the ſoil, the more watchful the farmer muſt be about this creature.

As the coleſeed plant requires ſo much care and attention, it is beſt to ſow it in drills, with intervals of ſuch breadth, that there will be an eaſy paſſage for weeders, and for any kind of care of the crop. If it be ſown at ſuch diſtance, that the horſehoe can be brought in between, the plants will be ſo much the ſtronger, that they will very well anſwer the farmer's purpoſe, whether for feeding or for ſeed. Though this crop requires ſo much attention at firſt, it is, when well rooted, extreamly hardy. Few plants ſtand the ſevereſt of our winters better.

The ſpring vetches ſown in March and April, will be in bloom in the beginning or latter end of July, according to the difference of the time of ſowing. As ſoon as they begin to open in flowers, they are in the higheſt of their perfection for cattle; and it is a very good practice at this ſeaſon to cut them, and feed horſes with them. They have many excellent qualities, and they are attended with no danger: they fatten cattle, and they encreaſe the quantity of dung. It is alſo found by experience, that the dung of horſes fed in this manner, has not the rankneſs of what is made from dry food.

During their growth they will have mellowed the earth, by thoroughly covering and ſheltering it, and their roots exhauſting little nouriſhment from it; the advantage is very conſiderable. Thoſe who do not uſe them as food for cattle, may now plow them into the ground, and they will rot in it, and prove an excellent manure. The method is to draw a heavy roller over the field, juſt as they are in the condition here mentioned of beginning to flower; and then to plow them in.

This muſt be done at the end of this month; and after the plants have lain to rot in the ground, there will be nothing more required than to harrow in the corn; three weeks or a month, according to the ſoil and ſeaſon, are ſufficient for the perfect rotting of the ſtalks of this tender plant, and with the mellowneſs the ſoil had obtained before, from the perfect covering of the ſtalk, it will be in excellent condition.

This is indeed the perfect manner of uſing theſe ſmall pulſe. They grow upon the ground, and mellow it all the time; and the nouriſhment they had exhauſted from it, in the mean while, is thus all reſtored to it again. The plants themſelves being then buried under the ſurface, after having been preſſed flat by the roller, rot in the ground; and they not only ſerve to aſſiſt in enriching it as a manure, but the fermentation which they bring on, happens juſt at that time when it is wanted for the ſeed. The earth is light and tender about the ſeed, and a paſſage is given to the young fibres of the roots, ſo that every thing promotes the vegetation.

Nor are theſe the only uſes of this ſmall pulſe. Horſes may be tethered in the field to eat off a certain quantity at a time, a time. without over-running or trampling down the reſt; and this practice enriches the ground like the folding of ſheep upon it; for the dung falling warm from the horſe, and his urine ſerve as a moiſt, rich, and excellent manure; and prepare the land for wheat, preferably to moſt other dreſſings.

The vetch is alſo an excellent dry food for horſes; but to this purpoſe it ſhould be mowed ſomewhat later in the growth, and a ſtrict watching of the time and period of growth is in nothing more neceſſary, than in this article. The young pods, while the ſeed is ſmall and tender in them, dry very favourably in the making of the hay, and nothing is a more agreeable or more nouriſhing food for horſes. If the vetches be ſuffered to ſtand till they are large in the pod, the leaves will decay; and theſe are a very eſſential article in the value of this crop: therefore the proper method is, to cut them for this purpoſe, juſt when the pod is well formed, and while the leaves are freſh, and in good condition. It will then dry well together, and a moſt excellent and nouriſhing hay is formed of the whole plant.

Plow in the crops of buck wheat toward the end of this month, which were ſown in May for that purpoſe. It is a quick growing plant, and will be in perfect order by this time. The exact ſeaſon when it ſhould be plowed in, is when the flowery heads are all formed, and are beginning to ſhew the bloom. It is a great improvement upon poor, gravelly, and hard loams. The growth of it upon the place has hitherto well ſheltered and mellowed the ground: and till it comes to form the ſeed, this plant exhauſts very little nouriſhment. When nature is employed in perfecting the ſeed, no plant exhauſts land more; but it does this at no other time; therefore let the farmer be ſure to eat it off, or plow it in before that period. Horſes are fond of it, and it is wholeſome food for them: it has alſo the peculiar value of coming at a time when other food is ſcarce. But the great benefit is that we have juſt named, of preparing a poor land to bear a good crop of wheat. To this purpoſe, when the heads are fully formed, and a few flowers appear, let the farmer go into the field at ſun-riſe with a heavy roller, and while the plants are freſh and full of juice, let them be all rolled flat to the ground; this will at the ſame time bruiſe and preſs them, and diſpoſe them to rot: then they are to be plowed into the ground, the ſooner after rolling the better, and there will be brought on the ſame light and uſeful fermentation, that we have deſcribed as the effect of the thetches; and the ground will be greatly improved.

The farmer is not to ſuppoſe this the only uſe of buck-wheat. He will find it very advantageous to let ſome ſtand for ſeed. The grain is large, and contains a great quantity of an excellent white flour. In ſuch ſcarcity of corn as the preſent, it may very well be brought into uſe for bread; and at other times it will be ſerviceable to the farmer in feeding his fowls. The value and excellence of the Norfolk turkeys is very well known, and they are fed in a great meaſure with this corn, which is found to give a particular whiteneſs to the fleſh of all fowls which eat it; and at the ſame time it feeds them ſo healthfully, that they are very juicey.

There is one poulterer not very far from London, who is famous for the excellent colour and taſte of his chickens, and other fowls; many have wiſhed to know the ſecret by which he exceeds others in his buſineſs: and I believe that his knowledge of the true uſe and value of buck-wheat, is either the whole, or at leaſt a very eſſential article. The ſhape of buck-wheat ſeed, and the colour of its rind are too particular to be miſtaken; and I have had the curioſity to examine the entrails of this perſon's fowls, and have found buck-wheat in them.

As the knowledge of this particular art of feeding fowls may be of uſe to the farmer, in the neighbourhood of great towns; or wherever there may be a demand for them, I ſhall inform the good houſewife farther, that I think the other ingredient is rice.

Damaged rice may be bought very cheap at the firſt hand; and whoever will try a mixture of two thirds buck-wheat, and one third rice coarſely ground together, will find the fleſh of fowls which are fed with it, will be of a delicate flavour and colour.

The plant itſelf is a good food for milch cows. They will eat it with great ſatisfaction; and it encreaſes the quantity of milk, and enriches it at the ſame time. The ſame good quality makes it excellent alſo for ewes which ſuckle lambs.

Let the farmer recollect all theſe uſes of buck-wheat, and at the ſame time that it will grow on very poor land,

and he will find that it might be much ſooner than it is, with very great advantage.

Clear the alleys of the hop ground very thoroughly this month, and raiſe the hills a little with the parings of the alleys. No weed muſt now be ſuffered to exhauſt the ground; the root of the hop ſpreads a great way, and the plant now requires all the nouriſhment that can be given it.

It is a cuſtom with ſome to plant other crops in the alleys of hop grounds; but this needful caution of perfectly clearing the whole ground, ſhews the folly of that practice. The diſtance of the hop plantation will doubtleſs allow very well of the growth of other things between; but all they produce will not be at all equal to the difference between the fruit of a hop ground, where the plants have all the nouriſhment, and one where theſe crops are raiſed beſide. This is one of the many proofs we have given the farmer, that all that is got, is not gained; for in theſe intermediate plantations in general, the loſs in the principal crop is more than the gain by the other.

When the farmer has the advantage of ſalt water near him, let him take this opportunity of cleaning his ſheep. They will now be recovered a little from the abſolute nakedneſs of the ſhearing, and will bear this waſhing without pain or damage. It will clean away all foulneſſes of the ſkin, and will deſtroy thoſe abominable and troubleſome vermin the ticks, which often torment the ſheep at this ſeaſon in ſuch a manner, as to make them refuſe their food, and pine away into the worſt of illneſſes. The expence of ſuch a waſhing as this will be very well anſwered by the health of the flock; and by the clear and good growth of the wool.

Pull up that miſchievous plant water crowfoot, or ſmall ſpearwort. It is now in flower. The horned cattle will ſometimes be tempted by its freſh green look to eat of it; and it throws them into many of thoſe diſeaſes which are troubleſome, and often fatal to them in the month of Auguſt.

Fold ſheep at this time very carefully upon the land intended for wheat; and that the ſoil may have all poſſible advantage from this excellent practice, feed the creatures well by day, that their dung and urine, and the perſpiration of their bodies may all be warm and rich, and fit for this excellent purpoſe. This is the ſeaſon at which the greateſt benefit of all is done by folding: therefore if it have been omitted earlier in the year, the deficience may eaſily be repaired, by doing it now.

For the ſame reaſon that this is the time when the land gets moſt good from ſheep, it is now that the greateſt benefit may be obtained from their dung and urine, in the covered fold for manure. We have given the method at large; and let the farmer who does not want the benefit of this folding upon his land, practiſe it now with all care, in the making up a quantity of rich manure from the cheapeſt and pooreſt of all materials. Any common dry mould will anſwer the purpoſe; let it be ſpread ten inches thick over the ground, at the bottom of the covered fold; and the dung, urine, and ſweat of the ſheep, will in a ſhort time enrich it into one of the beſt manures in the whole compaſs of the farmers ſtore.

Cream is very apt to grow ſour at this ſeaſon; and the good houſewife muſt uſe all her care to prevent it. After it has ſtood two days, let her give it one boil up over the fire, and then pour it into a clean pan. After this ſhe may for four days put in the freſh cream produced from her day's milk: every time ſhe muſt put the whole into a freſh and perfectly clean pan.

A dairy ſhould be at all times kept clean, but moſt of all now; and the houſewife will find that half the faults which have been attributed to other cauſes, are reaily occaſioned by a deficience in this one article of cleanlineſs.

Eggs will be in this ſeaſon in danger of ſpoiling upon the houſewife's hands: but with care a great deal of this miſchief may be prevented. The decaying of eggs is owing to two cauſes, the ſtagnation of the humours, and the evaporation of the moiſture. The firſt is owing to their lying always in one poſition, eſpecially if they be hot withal; and the other to the warmth of the air alone. To preſerve them for a ſmall time and from the firſt accident, they ſhould be laid cool and ſingle, where the freſh air has free paſſage; and once in ten days they ſhould be turned: this preſerves them a conſiderable time.

When they are to be kept longer, the method is to cover the ſhells with a coal, which will ſtop their pores, and ſo prevent the perſpiration. Some do this by a varniſh; but the eaſieſt method to the country houſewife is with fat. Reaumur of Paris found this to be an effectual method. The fat muſt be juſt melted, and the eggs rubbed over with it; nothing more.

The fields of woad ſown in March and April, will now require to be kept clear from weeds; and if the ſeed have been ſown in the common way, and the plants ſtand too thick, the hoers, at the ſame time that they clear the ground of weeds, muſt thin the plants.

We have recommended the raiſing this plant by the drill and horſehoeing huſbandry; and in that courſe the hoeplow muſt be now ſent into the intervals. This will tear up all weeds, and give a freſh broken ſoil to the roots of the plants. Before the plowing up theſe intervals, it will be proper for a weeder to be ſent in to pull up any weeds that may have grown in the rows among the plants; and as the ſucceeding plowing deſtroying all others, the crop will be freed from all incumbrance, aud furniſhed with a new ſupply of nouriſhment by the tillage of the ground, juſt at the time when it wants that aſſiſtance.

Woad is apt to ſuffer at this time of the year by the want of moiſture in the ground, for its large leaves require to be well ſupplied; and if at any time they are ſtinted in this particular, not only their growth is affected by it, but their colour.

It is found by experience in all kinds of crops, that the breaking of the ground by plowing or digging about them, makes them bear the drought better than they would otherwiſe: and this cannot be ſeen in any inſtance more plainly than in this of woad. The truth is, that breaking a ſoil well, and throwing it up with a freſh looſe ſurface, makes it more apt and ready to receive and detain the dews, than ſuch as is baked by the ſun, and hardened by reſt; from the cloſe ſurface of which they run off.

This is a good ſeaſon for drying and burning of peat to aſhes, which make an excellent manure. The hotteſt weather ſooneſt brings the peat into a condition for this ſervice; and the farmer muſt take a calm day for the burning them. He muſt take care that the peat does not burn ſo, as to exhauſt itſelf too much. The chymiſts know that the virtue of aſhes lie in their ſalt and oil; and the great power they have of giving fertility to land, is owing to theſe principles. Let the farmer be ſo far a chemiſt, as is neceſſary for his performing his buſineſs in a beneficial manner; and ſo much information may eaſily be given to him in this reſpect. The chymiſts know that the oil is

what

what gives colour to the aſhes of plants; and that a great degree of fire will burn it away. The farmer ſhould know this: and accordingly he is not to burn his peat into white aſhes, for in that caſe they will be robbed of the greateſt part of their virtue. Let him watch the burning of the heap; and when the peat is come to a browniſh red ſubſtance, let him put out the fire.

Nothing does this ſo readily or effectually as earth. Water would waſh away the ſalt, and damage the aſhes extreamly, but earth, on the contrary, puts out the fire without damaging the matter; and becomes itſelf alſo a kind of manure by the calcination it receives.

Therefore, when the farmer has piled up his heaps of peat, let him lay by the ſide of each a good quantity of mould; a tough clayey ſoil is beſt: when the peat is burnt to the degree we have mentioned, let a labourer juſt break the heap, and then throw on this mould. It will put out the fire effectually.

After this, when all is cold, let him remove the heap juſt off the ſpot where it was burnt, and then dig up one ſpade depth of the mould from the very ſpot where it lay. This is an earth ſo calcined alſo, as to be reduced to the condition of manure; and this is to be mixed with the reſt.

The aſhes are thus encreaſed to a much larger quantity, and the whole is no way inferior to what they would have been alone.

Clover is a good and uſeful food for hogs at this ſeaſon of the year; but they muſt not live upon it entirely. They ſhould be turned in a little before noon, and driven out toward evening: and muſt have ſome of the common food at night.

Flax will be fit to pull, in many grounds, this month; and the exact degree of ripeneſs, for this purpoſe, ſhould be watched with great care.

The hemp ſhould have the ſoil broke between the plants, and if there be any weeds they ſhould be carefully deſtroyed. The hemp is ſo ſtrong a plant, that it is not likely it ſhould ſuffer many to live among it; but what there are ſhould be pulled up: they will be large ones, and conſequently they will draw a great deal of nouriſhment from the ground, at the ſame time that the hemp wants it all.

The condition of this crop is, at this ſeaſon, very critical;

tical; the value of the threads will, in a great meaſure depend upon the ſupply the ſtalk has at this preſent period.

THE

HUSBANDMAN'S KALENDAR.

MONTH THE EIGHTH.

AUGUST.

THIS month affords the farmer fewer opportunities of actual ſervice, than almoſt any in the year, for his crops in general are taking their laſt growth, and his paſturage is recovering from the hay ſeaſon. Neither of theſe admit of any aſſiſtance from him in the common courſe of huſbandry: but in the horſehoeing method there will be great benefit in good plowing of the intervals between the rows in all kind of crops.

This will fill the ear and plump out the corn at the time when it is terminating its growth, and will, at the ſame time, be preparing thoſe intervals for the reception of the ſeed for a following crop. It is the advantage of this ſpecies of huſbandry, that while the crop is growing upon one part of the ground, the other is receiving the benefit of a moſt perfect fallow.

In the common courſe and practice of huſbandry it muſt take its chance. Only this we ſhall direct the farmer, that where his wheat fields are over-run with poppies, it will be worth his while to have them pulled up, in ſuch manner as can be done with any degree of conveniency; not only for the benefit of the corn, but becauſe the weed itſelf is uſeful: hogs are fond of it; and it agrees ſo well with this creature while ſuckling its pigs, that the milk is made abundant by it and very nouriſhing.

Though this month gives the farmer leſs employment than the generality of other ſeaſons, the next will be full of buſineſs, and he muſt take advantage of the leiſure of this to prepare for it.

A proper number of hands is very eſſential to a good harveſt, let him now be taking meaſures for them.

Let him lay in proviſions in time for the buſy ſeaſon, and brew the beer for his work people.

Let him mend up and repair the carts, waggons, and all other implements, that will be wanted at that buſy time; and ſee to his horſes that are to perform the labour. He ſhould be now more than ordinarily careful to get them into a good ſtate of health.

Let him now alſo provide for the mowing up his wheat in the barns; and make ſuch mowſteads as will keep it out of the reach of moiſture from the ground, and, in ſome degree, defend it from vermin.

The beſt foundation is a good bed of furze faggots: over which ſpread a layer of dry ſtraw. The pricklineſs of the furze will keep off many of the creatures which are apt to be moſt miſchievous in the barn. When the wheat comes to be mowed upon this, if there be any ſuſpicion of dampneſs, it will be neceſſary to keep a hollow in the middle of the ſtack, preſerving it all the way up to the very top. By this means the vapours will get out, which would otherwiſe do great damage to the corn; and vermin are often found dead in the bottom of theſe wells, the heat and vapour having ſuffocated them.

When this preparation is made for mowing the corn in the barns, the ſame ſort of care ſhould be taken for that which is to be ſtacked out of doors. The manner of doing this we ſhall deſcribe hereafter, this foundation is all we are concerned with in the preſent place; that being the work of the month of Auguſt.

A long ſquare is the ſhape of the ſtack, and let care be taken that the bottom of it lie ſecure, and above the reach of damp. The true method is this, mark out by a gardener's line, the form of the bottom of the ſtack: dig away half a ſpade's depth of the ſoil in a ſloping form all round it, making a brick drain for the perfect diſcharge of any water that may come there. This will throw off the wet from the heads of the ſtack. Cover the ſpot marked out with ſome ſmall faggots of black thorn, laying them cloſe and beating them down. Upon theſe lay a coat of furze faggots, level and ſmooth, and cover it with ſtraw a little before the corn is to be brought upon it.

If the farmer intend cocking of his corn, the ſame proviſion ſhould be made alſo in time, by laying a bed of black thorn, then a bed of furze, and laſtly, one of ſtraw. Or it may be proper to have a frame of timber in ſome places.

Whichever of theſe beds be preferred, the diſpoſition of the corn is to be the ſame; the lower part of the ſheaves is to be outwards, and the cock is to be raiſed ſmaller to the top. That kind of frame which is called the Dutch barn, is excellent for the preſervation of corn; for the top is always dry, and yet the ſides have free air. This plain contrivance is nothing more than four upright poſts, with a moveable roof, which may be ſupported at different heights upon the poſts by means of pins.

Toward the middle of the month, all this preparation ſhould be ready, for the early white or Holland wheat will be then fit for laying up, and in ſucceſſion the other kinds will follow. The lammas comes next after this; and laſt of all the bearded wheat.

Let the farmer take care he has the preparations we have named ready in time; and then let him look to his fields of early wheat, and examine carefully from day to day where the ear will be fit for harveſt.

When the corn is full plump and ripe, let him determine in what manner it ſhould be cut, by the ſickle, the hook, or the ſcythe. The beſt crops ſhould always be reaped with the ſickle, which has a hacked edge: when the crop is ſomewhat poorer, the hook, whoſe edge is ſmooth, anſwers beſt: and where the crop ſtands thin, and the ſheaves ſhort, the ſcythe does fitteſt for the buſineſs.

No reaping is performed ſo eaſily, or ſo advantageous to the farmer, as that of the fields which have been drilled in rows. In theſe the reapers have room to ſtand conveniently, the corn grows in a proper manner for cutting; and they can without difficulty cut deep and ſmooth.

When the corn is ſoft in the ear, the wheat muſt lie the longer on the ground; that it may harden.

Weeds are always troubleſome among wheat; but when the corn has been well ripened, and hardened in the ear, the trouble they give is all the damage: on the other hand, when the grain has been cut early, a great deal of care muſt be taken that weeds are not bound with it; for they will grow damp after the corn is dry; and will taint the corn, and do a vaſt deal of miſchief.

Wheat, in the due management, may get a great deal of benefit on the ground after it is cut. A few ſlight ſhowers will plump the grain, and do it nothing but good. The farmers always find that the more perfectly the wheat has been cured upon the ground, the better it will thraſh; and this is no ſmall convenience.

Though a little rain does this ſervice to corn, too much wet will prove in the worſt degree deſtructive. It will rot the grain in the ear; and the farmer who knows the danger of houſing it damp, will find it very difficult to find how to avoid that neceſſity.

In this caſe the method muſt be by actual heat. A malt kiln is the beſt convenience; and the ſheaves ſhould be laid upon hair cloth, or ſome other open ſubſtance with a very moderate warmth; and turned till they be perfectly dry.

Rye will be ripe for cutting about the middle of this month. The time will be a little ſooner, or later, according to the management and uſe that has been made of the ſpring ſhoot.

No crop will bear feeding in the blade ſo well as rye; and the manure left upon it by the cattle taking ſo good effect, that in favourable ſeaſons, when the farmer has found occaſion, he has had it eat twice in the ſpring ſeaſon; and yet found it come to a very good account afterwards.

After the ripe corn is cut, it ſhould not be left too long in the field, for being very vigorous, the rains will make it grow in the ear, and the farmer will loſe all his expectations.

In general it ſhould lie three days upon the ground before binding, but two or leſs will do. All this is to be governed by the ſeaſon. If a ſhower fall the firſt or ſecond day, it will do nothing but good: but if after this let the farmer be upon his guard, for there may be miſchief.

A good crop of rye may be got off a pea ſtubble; and this is not croſs cropping of the ground: it feeds ſheep in ſpring; and the ground is dreſſed rather than exhauſted by it.

Let the field of barley alſo be examined toward the latter end of this month. When the ears of barley hang down, and the grain is hard within them; and the ſtalks are perfectly yellow, not green in any part, this crop is fit for cutting.

It ſhould always lie three, four, or five days upon the ground after cutting, becauſe the dews ſwell the grain, and improve the flour that is in it; and the farmer may venture this with leſs hazard than any other crop, becauſe the grain of barley, from the nature of the huſk, is held faſt, and is not apt to ſhed.

The Fulham barley, which is ripe in ten weeks from ſowing when the ſoil and ſeaſon are favourable, comes in ſometimes early in this month for cutting. The great art in mowing of barley is to take it when it is not quite ripe, when the ears droop; but before they hang. And when the grain is hard, but not dry; in this caſe the air ſwells the grain a little, and this improves it in colour and quantity of flour. The judicious farmer will take particular care of this article, becauſe he will have a proportionable price.

When barley ſtands very upright, it ſhould be cut with the ſcythe and cradle, and in this caſe it falls in the moſt even and regular rows. The raking, cocking, and all the reſt of the work proceeds beſt and moſt eaſily after this; and there is little or no waſte.

Where the crop does not ſtand quite ſo well, the ſcythe and bale ſhould be uſed; and only for the worſt of all the plain ſcythe. The reaſon is very obvious; for the waſte which follows this confuſed manner of cutting, is and muſt be very great.

There is a chance the farmer may take of a crop of barley, much earlier than any of theſe, which is by ſowing it in autumn. But the ſucceſs depends in a great meaſure upon the ſucceeding weather. If the winter be mild, the ſucceſs is certain. Chance led to this, as it does to many other diſcoveries. They who firſt ſowed barley in autumn, meant it not for the grain, but for a ſpring feed upon the blade. They found that by means of the dung and urine the roots ſhot up ſtrong for ſtems ſoon after, and they reaped a crop they little expected. It is fit the farmer ſhould know this, for there are circumſtances in which it may be a very good and profitable practice.

In the ſame manner barley and wheat may be ſown together in autumn, in order to make a good kind of bread for common families. Chance firſt ſeems to have diſcovered this, as well as the other: a perſon plowed up a barley ſtubble once and no more, and then harrowed in wheat. The barley which had been ſhed and ſcattered upon the ground, was plowed in and harrowed over with the wheat, and ſhot with it. The winter proving mild, it continued to accompany the wheat in its growth, and both became ripe together.

This may be done alſo on certain occaſions by the farmer, to his great profit. He will learn by this, that the properties of the ſeveral kinds of grain are not ſo abſolute as might be imagined. We have ſhewn him before, that wheat may be ſown in ſpring, and ripened the ſame ſummer; and he ſees by theſe inſtances, that barley may be ſown in autumn, and out-laſt the winter. He is left to his own management, therefore with more freedom than is uſually thought, and according to the circumſtances, may very well expect crops in a various manner.

Oats will come alſo to be cut this month, eſpecially if the ſeaſon have been favourable, and the land has had good tillage.

The black oat exhauſts the ground leſs than any other, and this may be a very good reaſon for ſowing it on many occaſions; but the white oat makes the better oatmeal.

Five quarters of oats from an acre is accounted a good crop; but the ſame quantity of land is able to yield doubly ſo much. The cuſtom is to raiſe them without manure; but if they have this aſſiſtance, they will very well repay it; and taking on the whole account, it will be well worth the farmers while.

It is obſerved, that after ſevere ſpring froſts oats ſucceed greatly. The reaſon is, that froſt mellows the ground. It has the ſame effect with tillage; and the farmer may always ſupply its place by tillage.

They err extreamly who do not allow ſufficient plowing to the ground for this crop, for the produce will anſwer greatly for a little more labour: and the ground ſuffer nothing.

The cutting of oats ſhould be the ſame as that of barley. If they ſtand upright and well, it is beſt done with the ſcythe and cradle, which makes even work, and lays them in a very regular manner on the ground, and this prepares for the regular and eaſy management of all the reſt of the work. If the crop has been laid; or the plants thrown different ways by winds, they cut them with the ſcythe and bale in moſt places; and when the mower underſtands what he is about, this does not make bad work.

It has been found lately, that oats will ſtand very well through the winter; and after ſupplying ſheep with food at times, when that is a very eſſential article, they will yield good crops at harveſt time.

They may be ſown for this purpoſe in Auguſt, September,

ber, and October; and ſheep being fed from time to time upon the blade while young, and when they moſt want it, the field may be afterwards ſhut up in the latter end of March, and the crop will be very great. The dung and urine of the creatures will ſo richly impregnate the ſoil, that it will bear beyond what could be naturally expected; and the plants having taken great root during winter, will ſhoot amazingly, when they are permitted to riſe to head.

Chance leads to moſt of theſe improvements; or the farmers like the chymiſts, while they ſeek for one thing find another: but by whatever means ſuch diſcoveries are made, it will be wiſe to take the advantage of them for our future conduct. Certainly what has ſucceeded once, will, under the ſame circumſtances, anſwer again; and no knowledge in farming is ſo uſeful as that which ſhews in what manner the crops may be moſt varied; and that not only in reſpect of kind, but of growth.

The ſoils upon which this winter crop of oats have been tried hitherto are light, gravelly, or chalky. I once obſerv'd a crop of them upon the border of the fens upon a light loam, which exceeded all that I ever ſaw from the ſpring ſowing. The ſervice of food for ſheep, and certainty of a good crop afterwards, are very material articles.

Peaſe will come now into pod, and the farmer muſt watch his opportunity of cutting them. It is to be done when they have their full growth in the pod, and have begun to harden. In this caſe they get a great deal of good in lying on the ground; the pea ſwelling, and the flour mellowing within it. The haulm at this time has ſome power of conveying nouriſhment to the pods from the air, as plants receive it when cut from the ſtem, and ſet in water. If the farmer ſtays till the peaſe are hardened in the pods, he loſes this advantage; for the haulm is too far dried to be of any ſervice in this article.

Let him watch the fields of this pulſe carefully, and not expect always to be reminded in time, by the abundance of the bloom: for ſometimes the flowers fade as ſoon as they open, and conſequently there is little ſhew of this: but in that caſe, the crop is uſually extreamly good.

When the peaſe are in the condition we have deſcribed, the only conſideration is how beſt to cut them. The two implements for this ſervice are the pea-hook and the ſcythe. When the crop ſtands thick, the hook does beſt; but where it is an indifferent produce, and the plants lie looſe and ſtragling, the ſcythe makes quicker work, and very well anſwers the purpoſe.

A dry pea-harveſt is a great advantage, for the leaſt wet diſpoſes the pods to open, and the peaſe to fall out. The way to guard againſt this miſchief, is to take care they do not lie in the wet; for it can do little harm, unleſs it hangs upon them. For this reaſon peaſe which get wet, while they lie upon the ground after cutting, muſt be turned often, and lightly ſhook up. The motion in turning them will throw off ſome wet, and the winds will dry away the reſt. The whole haulm will alſo, by frequent and light turning, be kept from dampneſs; and this is a material article, while the crop is obliged to be left upon the ground. A wet ſeaſon at cutting therefore entails a great deal of trouble upon the farmer; but he muſt ſubmit to this, or to great loſs.

There remains a great care after all this, with regard to ſuch peaſe as have been expoſed to this unfavourable weather when cut: this regards the inning of them, as the farmer calls it; that is, the getting them home, and mowing them up.

The more wet they have been expoſed to, while they lay upon the ground, the more danger there is of their getting miſchief when they are mowed. Sometimes they will abſolutely rot and ſtink if they be put up careleſsly.

The hogs like them the better for having been wetted in the field, provided good care be taken of them in the barn or ſtack; but if they become damp, and rot there, they will not touch them.

This is a very tickliſh article. The wet which falls upon peaſe, after cutting, may be of great advantage to them, if it be not too great a quantity, nor too long continued; and if the due care be taken, that the peaſe in their pods be well dried again after their ſwelling, before they are put up; but if ny of this management be omitted, or lightly performed, there is the greateſt danger of their getting damage.

The horſe-bean comes naturally under conſideration after the pea, and indeed it is no bad practice to ſow them together; they will be of great mutual advantage to one another. The bean ſtalks will ſupport the peaſe; and the haulm of the peaſe, as it trails upon the ground, will ſhade the roots of the beans, and mellow the earth about them. There is alſo another eſſential reaſon why this ſhould be done, which is, that theſe two crops approaching more to garden than field herbs, are liable to many accidents upon the ground; and thoſe things which affect one kind, do no harm to the other. Some years peaſe in general fail; and other year's beans come to little: but the ſeaſons and accidents which affect the one, have no force upon the other: therefore when they are ſown together, there is the double chance of ſucceeding; for if either fail, there will be the more nouriſhment for the other, and conſequently the farmer will have his due produce one way or other from the ground.

When horſe-beans are planted alone, the beſt way of cutting them is with the ſcythe: but for this there ſhould be early preparation made on the management of the ground. The field ſhould be laid level by rolling, and the work in harveſt time will then go on regularly and well.

Rolling the fields of beans has indeed ſo many advantages independant of this, that it ſhould never be omitted. The earth is apt to be broke too much by their large ſhoot, and often from that accident it will lie looſe about them for a conſiderable time, and hurt their growth. The rolling preſſes it firm to them, and prevents this accident.

There is a ſmall brown ſlug that often makes great havock in bean fields, while the crop is young; this alſo is altogether prevented by the beneficial practice of rolling: for the ſlug is killed, at the ſame time that the earth is preſſed to the roots of the plants. For this purpoſe the rolling muſt be performed early in the morning; and there is no growth of the bean in which it can be done with ſafety, but while very young; for when the crops have any ſtrength, the ſtalk would be cruſhed, and would not recover. Therefore this operation ſhould be performed in a dewy morning, at ſunriſe, when the beans are about one inch out of the ground.

The vulgar practice is to roll the ground as ſoon as the beans are ſown. This anſwers the purpoſe with reſpect to mowing, but nothing more. It is as cheap and eaſy to do it at the time here named, and take the advantage both of the preſſing the ſurface flat, and ſerving the crop. The cleanneſs of a crop of beans is a great advantage at the time of mowing; and this muſt alſo be provided for in time. The practice of ſome is to hoe between the beans; but there is an eaſier and cheaper method. The principal weed that infeſts the bean crops is charlock: ſheep are fond of this, and they do not regard beans. If theſe animals be turned into a bean field in May, they will not hurt the crop; and they will clear away the weeds very perfectly.

Whence a crop of beans have been thus carefully and regularly raiſed, there will be little trouble in cutting them; the ſcythe will very well anſwer the purpoſe; and this is an implement that makes quick riddance.

In ſome places they uſe the hook and ſwipe: the reaper, in this way, pulls a handful toward him with his left hand, and cuts them with his right; and though it appears an awkward and difficult buſineſs at firſt, yet practice will bring theſe people to ſuch dexterity in it, that one man, if the crop has been drilled, will cut an acre and half in a day.

Very rich crops of beans may be ſometimes reaped as wheat, and very poor ones muſt be pulled up by hand; but the general and beſt practice is mowing them with the plain ſcythe, a boy follows the mower, who throws them up in heaps: they afterwards lay all theſe along the ridges of the lands, and dry them gradually, and with very little trouble. Where the crop is not of the ſtrongeſt kind, the expence of this may be ſaved by mowing the beans with a ſcythe, and a three-ribbed cradle. This lays them regularly, as they are cut.

The value of a bean crop is not ſufficiently known; for the farmers do not venture upon a proper management.

Let the land be dunged and well dreſſed for horſe-beans, and it will not be difficult to obtain forty buſhels from an acre. The land is afterwards ready for wheat: for though the beans have had great advantage from the dung, they have not exhauſted its virtue: they root ſlightly, and wheat may be ſucceſsfully ſown upon the ground immediately, without dreſſing.

Let the farmer remember that his ſtubbles will be ſoon ready for the pigs, and let him prepare for it accordingly, by weaning them from the ſow. They will bear this very well at ſix weeks growth, which is a natural age for them at this ſeaſon of the year; and a little tar rubbed upon the teats of the ſow, will ſoon cure them of going there for food. They will feed very well upon following the ſow into the ſtubble; and this early weaning them favours another litter of pigs, by preparing the ſow for boar again.

Many other of the leſſer crops now come in for cutting:

the end of Auguſt is their great time. Canary ſeed is one; and as the market is not over-ſtocked at preſent, it anſwers very well. It requires little trouble in raiſing; the reaping is generally the work of the ſcythe, and comes cheap; the haulm is naturally dry, ſo that it makes eaſily into a condition for thraſhing. And the market price of the ſeed is a very good one.

Cows are fond of the ſtraw of this crop; and to favour its uſe, the plant ſhould be cut before it is perfectly dry. The ſeed will harden ſufficiently, by lying a very little time upon the ground.

As the TEASEL begins to ripen its heads, cut the ſtalk half through, a little below them. This will prevent an abundant ſupply of nouriſhment, at a time when they do not want it; and they will dry the ſooner. This alſo is a more profitable crop than many farmers are aware; ſixty heads or more are often produced upon one plant, and there is a market for them abroad as well as at home. Indeed it would be very much our intereſt to keep them at home, as well as the ſeveral other articles which concern the cloth trade. Nature ſeems to have put this into our hands, in preference of all the kingdoms of the earth, and we are very blameable for having let it, in ſo great a degree, ſlip out of them. It ſhould ſeem as if Britain were determined by nature for the cloathery of half the world; not only our wool is fine, but the leſſer articles have an excellence they reach no where elſe. Our fullers earth is eſſential in the higheſt degree; and theſe teaſel heads which ſerve as a kind of natural bruſhes in preparing the cloth, are produced in an excellence that they have no where elſe. We are thus furniſhed with the means of a manufacture, almoſt as eſſential to life as food; for certainly cloathing is the next thing after it: we have thrown it into the hands of thoſe who cannot half ſo conveniently perform it, by our want of attention in the higher claſſes, and of integrity in the lower. Let the farmer learn from this example, to regulate his own conduct, and not attempt to add a little to his preſent gains, at the expence of his reputation.

Cut flax this month, judging of the due time by the firmneſs of the ſtalk, and of the ſeed veſſel, and let a great deal of care be taken that it gets no damage upon the ground.

The clover fields intended for ſeed, which have not been mowed for a firſt crop, but fed in ſpring, and then made up, will now be fit for cutting.

The common way of cutting clover is with the plain ſcythe; and where the crops are but indifferent, this may be right, but in a well managed clover field, that is now to be cut for ſeed, if the plants are high, and the growth tolerably regular, the beſt method will be to do it with the ſcythe and cradle, in the common way. With the plain ſcythe a great many of the ſeeding heads are cut thro'; and the crop is left ſo irregular upon the ground, that there is a deal of loſs in making it up. But this way with the cradle every thing is performed with regularity; the plants lie even, and there is no difficulty in their management, and very little loſs.

The third week in Auguſt ſow the laſt crop of turneps. If they ſucceed, they will ſtrengthen themſelves very well in the ground before the cold; and if they fail, the damage is not great, for the ſame land will be in a very good condition to be ſown with ſome of the winter corn.

The crop of turneps which were ſowed the laſt month, will now require hoeing. And the hoer muſt thin the plants, as well as cut up the weeds. The buſy time ſometimes makes this neglected; but the conſequence is either the utter loſs of the crop, or its coming to very little. The heat is great at this time, and there uſually want rains. Though it be a uſeful ſeaſon for ſeedling crops, it is not a natural one; and whenever the farmer makes free with the common courſe of nature, he muſt take double care. If the plants ſtand too cloſe, at the ſame time that they want the ſupplies of ſhowers, they will come to little good, under this double diſadvantage. The thinning them is neceſſary, becauſe the ſupply of nouriſhment is ſmall, and the breaking of the ſurface with the hoe diſpoſes it to receive the dews the better, and to keep moiſter about the roots.

Sow coleſeed alſo this month on ſtubbles.

Juſt before the cutting of peaſe, ſow clover on the ground: it is an odd practice, but rational enough when duly conſidered, and the ſucceſs has been found to anſwer perfectly well. The ground is very mellow at this time, becauſe it has been ſo long covered by the haulm of the peaſe. The clover ſeed, if it be ſcattered by hand upon the land, while the pea crop is growing, will find its way to the ground, becauſe it is ſmall; and the reapers will tread it ſufficiently into the earth, as they perform their work. There is no way of ſowing ſo eaſy, nor any that anſwers better.

Turneps may be raiſed in the ſame manner, and with as much ſucceſs. Scattering the ſeeds over the ground among the peaſe, before the reaping: they will in the ſame manner be trod into the ground, and the ſoil being ſo mellow, there is very little doubt of their ſucceſs. Experience ſhews, that theſe kinds of crops rarely fail.

Often, when both the clover and turneps which have been ſown in the common way, have come to nothing, theſe have ſucceeded, and been the great reſource of the farmer in thoſe articles.

The land that is preparing for the autumn ſowing of wheat, muſt now be plowed, to get into good condition; and if it be a ſtiff ſoil, the beſt method is to lay it up in ſharp ſingle bouts. This, after the preceding plowing, will probably finiſh the work. Theſe repeated plowings have from time to time more and more broke the ſoil, and it will, by this laſt operation, be thrown up in ſo excellent a manner to the ſun and air, which are both powerful at this time, that it will moulder on the ridges, and be ſoon brought into a fine and perfect tilth, ſuch as is neceſſary for receiving the wheat ſeed. This is very eſſential in the farmer's care; for though theſe ſtiff ſoils require all this labour and attention to bring them into the due condition, for receiving the ſeed of wheat, yet when they are thus prepared, none ſupport it ſo well.

This is a good ſeaſon for plowing in the green vetches into the ground, for preparing it for the winter corn. The cattle may be turned in about the middle of this month to eat off the head of the crop; and toward the end, the remainder ſhould be rolled flat to the ground, and then plowed in. Care muſt be taken in doing this, that the ſtalks are duly covered; and they ſhould lie thus to rot about three weeks: then the wheat or rye ſhould be harrowed in, and the ground will be in ſo excellent condition for promoting its firſt ſhoot, that there will be no doubt of its being made with ſtrength. More depends on this particular than the common farmer is aware; for when the firſt ſhoot is poor, there is no great hope of the crop, unleſs very particular care, or very favourable accidents aſſiſt it.

Clove may, in the ſame manner, be plowed into the ground at this ſeaſon with ſucceſs: but the beſt method is to aſſiſt it farther by the addition of ſome manure. Thus a very poor ſoil, which has a tolerable crop of clover upon it, if ſome dung and ſoft mouldered chalk be ſtrewed upon the clover, and then the whole be plowed in together, will produce a vaſt plenty of wheat. In this caſe the clover ſhould be plowed in about the end of this month, and ſhould lie near a month to rot in the ground, after which the wheat is to be harrowed in.

The middle of Auguſt is a very favourable time for drying thoſe milch cows which the farmer intends to fatten. They are to be turned into good paſture; and if they do not get this way into good condition, they muſt be ſtall-fed to finiſh them.

This month, as faſt as the incloſed corn fields are cleared off, turn in the cows, together with the hogs; they feed upon different things, and do not at all interfere with one another. The graſs and weeds upon the banks and edges are the food of the horned cattle, and the ſcattered corn of the hogs.

After theſe the domeſtick fowls ſhould be put in. They will find a great deal that the hogs have left; and will produce a fair profit to the farmer.

THE
HUSBANDMAN'S KALENDAR.

MONTH THE NINTH.

SEPTEMBER.

CLEAR off the ſtubble fields as ſoon as that can be done without injury to the crop; that the cattle, and the reſt of the ſtock, may have the advantage of feeding on the ſcattered grain and pulſe. The ſooner theſe are turned in the better; for if it be any time neglected, the wild birds of all kinds take the advantage, and it is not the farmer's buſineſs to give theſe a habit of coming into his ground.

This month the farmer is to begin ſowing of wheat; and he may continue it as occaſions require, or as the circumſtances of his farm direct, during this and the ſucceeding month. Let him remember that it is on this crop his principal dependance is placed; and take all due care in putting it into the ground.

Some land, we will ſuppoſe, has lain fallow for it the whole ſeaſon: we have from time to time directed the farmer in the management, which will turn that fallowing to moſt account; and he is now to ſow.

The ſeed corn muſt be purchaſed with care; examining its ſoundneſs; and the farther off the farmer's land it grew, the better. Let it be ſteeped carefully, as we have directed in the preceding volumes; and all light corns ſkimmed off and thrown away, they would only deceive the farmer, for the principle of vegetation is loſt in them.

Beſide the fallowed land, there may be ground in many other conditions, naturally and properly ſowed with wheat this month; or dreſſed in ſuch manner, as to prepare for ſowing that grain the next. Clover lays are of this kind; and other artificial graſs ground. Paſture ground, that is intended to be brought into tillage, is alſo now to be plowed up for that purpoſe: and on this occaſion, no implement anſwers like the four coultered plow. One working with this will ſerve the purpoſe of three with any other plow, becauſe of the number of the coulters by which it cuts the turff all to pieces, and deſtroys it at once.

Where a clover lay has been turned up for wheat, and the clover plowed in after the wheat is ſown, it is an excellent method to fold ſheep upon it, piece by piece, till the whole ſurface has had them upon it, and has been dreſſed in this manner by their dung, urine, and perſpiration. This has the advantage we have ſo often named to the farmer, ariſing from a mixture of manures: the clover, which has lain to rot in the mellow ſoil for a month, proves an excellent vegetable manure; and the folding of the ſheep upon the ſurface, adds a very rich and fine one of the animal kind: theſe join their effects in promoting the firſt ſhoot of the ſeed, and ſending it up with vigour; and we have explained before, how great advantage it is to any crop, to make the firſt ſhoot well.

If the ground be ſuſpected of ſlugs, let proviſion be made againſt their damage, by adding to the ingredients in which the ſeed is ſteeped, copperas and nitre, in moderate quantities. The effect of theſe is very great in aſſiſting the firſt ſhoot of the corn; nor is it a little ſervice, that they render it diſagreeable in taſte to theſe miſchievous devourers. If theſe be not ſufficient, it will be proper to mix a little flour of brimſtone with the lime which is ſifted over the ſeed, after it is taken out of the brine. This never does any harm to the growth, and it is ſo diſtaſteful to many creatures, as to be an excellent preſervative.

Something there is in the uſe of copperas on this occaſion, which brings into ſuſpicion the doctrines of that excellent writer, Dr. Home. But when experience is on the ſide of what we direct the farmer to do, the moſt reſpectable names ſhould not prevent us.

What is called copperas is the ſalt of iron; the name has led ſome to ſuppoſe it the ruſt of copper, but that is a miſtake: the ruſt of copper is called verdigreaſe, and is a poiſonous ſubſtance, and not meant in theſe receipts. The ſalt called copperas is made from a vitriolick mineral, called pyrites, containing iron; and the copperas itſelf is the ſame thing with the ſalt of iron, obtained from iron itſelf, by any other means. Dr. Home conſiders iron as a poiſon to vegetables: now we have obſerved, that on the contrary, iron makes a part of all vegetables: and it appears by the uſe of this ſalt of iron in the liquor, wherein ſeed corn is ſteeped, that far from deſtroying vegetation, or acting as a poiſon to the plant, it not only defends it from inſects, but promotes its growth.

When we ſee uncertainty in the writings of the moſt ingenious, it ſhould learn us to be modeſt in our opinions: we ſee the ſame thing in different forms, may have very different effects upon vegetation.

The beſt kind for ſowing upon the clover lay, is the red perky wheat. It ſucceeds better than the red lammas. Leſs of the ſeed will anſwer the purpoſe, becauſe this produces more ſtalks from each root; and the price it brings to market is nearly the ſame.

When the ſeed is harrowed in, the farmer ought to have a watchful eye over the buſineſs: for the purpoſe is to cover the ſeed without raiſing up any of the roots of graſs or weeds, which had grown among the clover. The more harrowing is uſed, the more danger there is of this; but ſo much muſt be allowed as will cover the ſeed. Let the ground be harrowed twice or three times lengthwiſe, and let him obſerve whether this raiſes enough of the mould for the proper covering of the ſeed corn: if it does, let there be nothing more done in this matter. If this do not raiſe enough of the mould, it muſt be harrowed croſswiſe. This muſt be done with great art and care, for it is in this the danger lies, of pulling forth the roots of weeds, which will by that means be ſet to growing.

When a piece of rich ground has lain two years in clover, worms are always very plentiful in it; and they will prove miſchievous to the crop of wheat that is ſown upon ſuch ground, if care be not timely taken, and the proper ingredients uſed in the ſteeping and ſowing. The moſt ſecure practice is this: mix copperas in the liquor wherein the ſeed is ſteeped, and ſtrew ſome ſulphur over it with the lime. Then for a top dreſſing, after it is in the ground, ſprinkle a good quantity of lime and ſoot. The worms will be deſtroyed by this, and the ground at the ſame time enriched.

The ſowing wheat upon a plowed ſtubble, is a practice for this ſeaſon of the year, but it is ſo hazardous, that we can ſcarce recommend it to the farmer. If he will venture upon it, let him take the proper caution.

No damp land can by any means bear this management. The ſoil muſt be light and dry, and it muſt have good tillage, and very ſufficient dreſſings. The moſt adviſable method is, not to dung the land before the ſowing, but immediately after. Thus let the ſtubble be plowed up, the ſeed harrowed in; and then bring on the dung, which muſt be rich, fine, and well rotted. This muſt be ſpread thin upon the land as ſoon as the ſeed is in, and thus lie till it rots away, the rains carrying the very ſubſtance of it into the ground. The dung warms, and at the ſame time covers the ground; it keeps off the effects of the cold from the crop at its firſt coming up, and at the ſame time enlivens the ſhoot. This is the moſt certain method.

Wheat in rich and dry lands will ſucceed very well upon a barley ſtubble with due care. The method is this: as ſoon as the barley is off the ground, plow up the ſtubble in broad lands, and let it lie three weeks, then harrow it plain; after this plow it into broad lands again, and then harrow in the wheat ſeed.

This ſeaſon ſow wheat alſo on the pea ſtubble; there is nothing wheat fallows better thanpeaſe, but care muſt be taken to refreſh the ground in ſpring by a top dreſſing, while the wheat is growing. A mixture of ſoot, lime, and pigeons dung is excellent for this purpoſe, or other kinds may alſo be proper, according to the nature of the ſoil; and the farmer will find directions for his choice on all occaſions in the preceding chapters. By one or other of theſe methods he is to keep up the ſpirit and vigour of the growth in ſpring, and he needs not to fear having a very plentiful crop. If the drill and horſehoeing huſbandry be uſed, the ſucceſs is yet more certain: for by this practice a great degree of ſtrength and vigour can be given to the crop, not only while it is under the firſt ſtate of the ſummer growth, but throughout the whole time. For the turning up the intervals between the rows, during the growth of the crop, in that method, acts as a dreſſing of any of theſe ingredients, for the time. And has the advantage over them, that it can be repeated throughout all the ſeaſon of the growth, which no other can.

A bean ſtubble is another excellent kind of ground to be plowed up in September for the ſowing of wheat. Pulſe, though they grow large, do not exhauſt land in the manner of corn. Their ſpreading leaves and branches cover and ſhade the ſurface, ſo that the ground is mellowed, and weeds are not permitted to grow upon it. All the time the crop roots ſlightly; and receives more of its nouriſhment from the air than from the earth, ſo that upon its being removed, the ground is in good condition for this principal growth, the wheat. Theſe lands will require no more at this ſeaſon than once plowing, and then harrowing in the wheat; but in the following ſpring it will be very proper to aſſiſt the young crop, by a top dreſſing of ſome of the fine light and rich ingredients. This is the method of raiſing wheat in perfection, upon the ſtubble of another crop. It is of great advantage, becauſe it places an advantageous growth, inſtead of a year of fallow.

This month ſow rye, and chuſe for it the proper ſoils, loam, chalk, gravel, or ſandy ground. On any of theſe ſoils, when the farmer doubts there being in a condition to produce wheat to advantage, let him ſow rye.

The earlier in autumn this is got into the ground, the better crop may be expected from it; for the damage which moſt affects rye, is the chilling of its roots by the firſt froſts. The better ſtrength they have got in the ground, the more able they will be to bear this, and their leaves will be a defence to the roots, if the ſeed have been put into the ground in ſuch ſeaſon that they have made ſome ſhoot of tolerable ſtrength, by the time they are wanted for that ſervice.

The farmer may ſow rye for two uſes, the feeding his cattle in ſpring, and the ſtanding for a crop at harveſt. If he ſeparates theſe two articles, the ſeaſon of the former ſhould be earlier than that of the latter purpoſe. Rye that is ſown to raiſe food for cattle, ſhould be got into the ground in Auguſt; and that for a harveſt crop in September. But there is no need to keep theſe two articles ſeparate. I have ſhewn that corn may be fed very freely while in the blade, and yet will make a good harveſt if ſhut up in time, and this is plainly what the farmer ſhould attempt. If he manages well, the cattle will do good inſtead of harm; and by laying up the field at a time when it has done the beſt of its ſervice in feeding, it will yield very plentifully at harveſt.

Rye ſucceeds well upon the moſt looſe and brittle ſoils, if the farmer will allow it the advantage of a folding as ſoon as it is in the ground. In this caſe the feet of the ſheep tread down the looſe ſoil, and fix it ſo well about the ſeed, that it keeps a good hold during the growth, and at the ſame time the land receives a rich dreſſing from their dung and urine, which does not evaporate at this cool ſeaſon, as it would in the heat of ſummer; and the corn wants it: for the growth of rye is very large; and the more the ground is enriched in the beginning of its growth, the fuller will be the crop at harveſt.

Sow rye now alſo upon a turnep ground that has been eaten off, and there will be the double advantage of two crops in the place of one, upon the ſame land; and the ſtrengthning of the rye by the dung and urine of the ſheep. The proper method is to prepare for this in time. Sow Dutch turneps in May, and they may very well be eaten off by ſheep by the laſt week in September. And at that time the rye may be conveniently ſowed. The ground will be rich, and the crop will ſhew it in its firſt growth. I have obſerved, that rye ſown after turneps in this manner, ſucceeds better than in almoſt any other courſe.

Steeping of rye ſeed is a very proper article in the management of this grain; and the later the ſeed is ſown, the more neceſſary this is. The beſt receipt is to diſſolve ſalt petre in water, and pouring it on the ſeed, after a little time, to add the black or red water that runs from dunghills. Experience ſhews this ſtrengthens the firſt ſhoot of the grain.

Toward the end of this month ſow the winter vetches; they will be ready at an excellent time in ſpring: they will come in for feeding the cattle after the turneps are over, and before there is natural paſture.

The large kind, called the gore vetch, which is particularly excellent for feeding horſes, ſhould not be ſown in autumn; for it is tender, and the chance is equal whether it ſtand through the winter or not. I have ſeen it ſucceed, and I have ſeen it fail: but as the mildneſs or ſeverity of the winter alone are to determine in this reſpect, and as theſe cannot be foreſeen, it is idle in the farmer to run the hazard, becauſe the other kinds will anſwer the purpoſe, if not altogether ſo well, yet in perfect ſecurity.

The laſt week in September take potatoes out of the ground: they will have their full growth by this time, and any longer keeping them in the earth, throws them needleſly in the danger of froſts. They may be preſerved during the winter, in dry trenches lined and covered with ſtraw, and headed with a ridge, and will thus be always ready for market.

The potatoe is at all times a valuable root; but as we ſeem now threatened with an artificial ſcarcity, or at leaſt with an extravagant price of corn, which they who ſhould prevent, ſupport; there is double reaſon to conſider it. This root in a great degree anſwers the purpoſe of bread to many; and a better way than depending upon it entirely, is to mix the meal of it with flour. Equal quantities of theſe wrought up in the common manner, make a wholeſome and good kind of bread. It is fit the poor ſhould be reminded to take care of themſelves, when thoſe who ſhould be their protectors oppreſs them.

The ſtubble fields will now ſerve as a reſource to the ſheep. The beſt method of managing them is to turn them firſt into one, and then into another; not letting them eat the graſs, they find them too cloſe; but giving it time to recruit a little, while they are going the round of the ſeveral fields; ſo that the firſt they were put into may be a little recruited by that time they are taken out to the laſt.

By this method they will be found in food till the forward ſown turneps are ready to feed.

This method fattens them up early for the butcher. The proper age of the ſheep is ſhewn by their having ſix teeth; for when they are younger, they will not fatten near ſo readily.

THE

HUSBANDMAN'S KALENDAR.

MONTH THE TENTH.

OCTOBER.

THE buſineſs of the laſt month may be naturally and properly continued into this; and whatever was begun in that may be finiſhed now; or whatever has been omitted then, may be now done, taking for this purpoſe the firſt week, and providing accordingly.

Continue ſowing wheat this month, but the earlier it is got into the ground the better. Different accidents may influence the farmer in this particular; but he ſhould always get his wheat into the earth, as ſoon as the nature of his affairs will permit. The farmer knows the value of his wheat will depend upon the fineneſs of the flour it yields; and the name of Hertfordſhire white is very well known among all dealers. This is the produce of the red lammas wheat; red in the ſtalk, ear, and ſkin of the grain, but whiteſt of all in the flour. This is a reaſon that the farmer ſhould prefer the red lammas wheat to all other kinds, not only for its real, but its received value; but there are particular ſoils which other wheats ſuit better, and there are ſome kinds which come ſo near this in its qualities, that the difference in price is ſmall. And in theſe caſes it muſt be the beſt courſe for the farmer to chuſe theſe.

In gravelly and chalky ſoils, he ſhould ſow the pirky wheat. The lammas requires a more firm and ſound earth.

This perks or perky wheat is ſhorter in the growth than the red lammas, and its ſtalks and ear are white, but the grain has a red ſkin. The flour is very like that of the lammas.

There is another kind between the two in value, and it requires in the ſame manner a ſoil of a middle nature between one and the other. This is the yellow lammas: if the farmer has a gravelly ſoil where there is a great deal of loam among it, this will ſucceed excellently. The yellow lammas is ſo called from the colour of the rind of the grain. The ſtalk is white, and the ear is reddiſh and ſhorter than the red lammas. The flour is of a very good colour, but this kind of wheat is apt to run too much to bran.

Theſe are nice diſtinctions, but they are abſolute: and the thing is of ſo much importance, that it is very well worth the farmer's while to attend carefully to them.

In light ſoils, inclining to ſand, the white wheat ſucceeds better than any of theſe: this is an excellent kind. It does not grow ſo tall as the red lammas, and the ſtalk and ear are white: there are more huſks about the grain than in common wheat, and the ear is thicker, and when ripe, looks rough. This kind yields an excellent flour, and in great quantity; it is conſiderably different from the others, and the difference is very obvious to the eye. It is therefore eaſy to propagate it; and there is none of all the kinds of wheat that is ſo well worth the farmer's regard.

If the farmer have a tough ſoil, in danger of more wet than is agreeable to wheat in general, let him chuſe, when he muſt ſow wheat upon it, that particular kind which is called duck-bill wheat, and grey pollard. This is a bearded wheat, with a large thick ear. The chaff is uſeleſs, but the flour is excellent for common ſervice. It will bear more damp than other wheat, but it requires the ſoil to be in very good order, and it muſt have its full time in the ground; the lateſt it ſhould be ſown is the firſt week in October, and the latter end of September is better. This wheat ſells for leſs than the before-mentioned kinds, but it produces more in quantity than any; ſo that the large produce makes amends for the lower price. The farmer who ſows this on ſuch land as we have named, will make conſiderably more profit, and with leſs hazard and trouble than he could from the ſame piece with any other.

The mealmen know how to mix one third of this with two thirds lammas, and the flour is very good; it will alſo bear tolerably well in an equal proportion: but for family ſervice it is very good alone. The great duck-bill wheat, with the kernels in four rows, inſtead of two, is another excellent kind for heavy lands. The produce is very great, but the weight of the ear makes it in danger of lodging, eſpecially if there be not due toughneſs in the ſoil. The ſtalk of this wheat is brown, and the ear is pale or whitiſh. It is a very profitable wheat, but it requires the ſoil we have named; and that it ſhould be well in heart; for it draws a great deal of nouriſhment: nor can it be ſuppoſed that this great quantity of grains can be ſupported, without a great deal of food. To raiſe it in perfection, let the ſtrong land that is fit for it be got into a fine tilth by the end of September. In the very beginning of October let the ſeeds be ſowed, and immediately after let the ground be lightly folded. This will encourage ſeedſhoot, at the ſame time that it preſſes the earth to the ſeeds, and diſpoſes them to take good hold of the ground.

The beſt way of ſowing it, is by the drill huſbandry.

Upon a dry loam the double ear'd, or many-ear'd wheat ſucceeds very well; this has two or more ears upon the ſtalk, and there was a time when it was ſuppoſed therefore to be doubly profitable: but farming is better underſtood now; and we know that the beſt land can feed but a certain quantity of wheat, whether it grow by two ears or by one. There is no real advantage in the double growth of this kind; and the farmer needs not regard it, otherwiſe than as it ſuits this particular kind of land.

For the fineſt, richeſt, and beſt prepared land of all, we ſhall recommend to him that kind of wheat, which from the thinneſs of the rind of the grain, has obtained the name of eggſhell wheat. The flour of this is excellent, and it yields a large quantity. The wheat is of middling growth; the ſtalk is of a pale yellowiſh hue, and the ear browniſh: there is no flour comes up to this in excellence. The ſeed is to be procured from the Berkſhire farmers, but they are not very ready to part with it. This is beſt ſown the ſecond week in October, and dreſſed immediately with a fold. The drill and horſehoeing huſbandry raiſe it in the greateſt perfection, but it will ſtand as well as any wheat in the common methods.

The end of October is as late as any prudent farmer ſhould keep his wheat out of the ground; but accidents may ſometimes compel him to ſubmit to what his judgment diſapproves. The chalky lands will bear late ſowing better than the clayey; and he ſhould manage his affairs accordingly.

A great deal of miſchief is frequently done to wheat by the grub. This is a white worm, with a hard red head, and ſix legs. It is bred from the common beetle, called the cock-chafer, and will live through the winter, if undiſturbed; and frequently eat off the corn juſt above the root. The miſchief they do in graſs grounds is the ſame; and the farmer has no worſe enemy, when he ſuffers them to multiply upon him. This creature naturally reſides juſt under the ſurface of the ground, and conſequently any turning up of the ſoil diſcovers it. The farmer ſhould obſerve whether there appear many of them in the field he is about to ſow with wheat; and if there be, he ſhould ſet about their deſtruction with care. The roller is the proper inſtrument, for their bodies being ſoft, are cruſhed, and entirely deſtroyed by it; and they become then a manure to the ground, the fruits of which they would otherwiſe have devoured. The rolling ſhould be performed ſoon after the ſeed is in the ground, and it will do nothing but good; preſſing the ſoil, fixing it to the grain, when it is about to ſhoot in an advantageous manner.

Let him next examine his paſture grounds, for the ſame devourer. Theſe creatures are better concealed there, by lying among the matted roots of the graſs; and they do ſo much miſchief, that it is very well worth while to be at ſome expence to deſtroy them. They are moſt common in ſuch paſture land as is moſt neglected; where there are buſhes and anthills, and where their great deſtruction, the roller, does not come.

If the farmer finds his graſs very deficient in ſuch paſture, beſide the natural cauſes owing to his neglect, in ſuffering thoſe incumbrances upon the ground, let him turn up here and there a piece of the ſurface, and examine among the roots of the graſs, probably he will find many of theſe worms in ſome places. They are in a manner innumerable, and if any good be hoped for the future from that piece of ground, they muſt be deſtroyed. This cannot be done without tearing up the buſhes, and cutting up the anthills; but this alſo is neceſſary to the improvement of the ground, and the expence will be very well anſwered by the following produce.

When the ground is cleared of theſe incumbrances, let it be very well rolled with a heavy roller, and this repeated ſeveral times. Let a mixture of lime, aſhes and ſoot be uſed as manure, and ſcattered over the ground tolerably thick, when there is a proſpect of rain. It will be an advantage to roll the ground as ſoon as this is on, becauſe it will prevent the beſt virtues of it from evaporating, and will force it more down upon theſe creatures.

By theſe means the grubs will be deſtroyed, and the ground at the ſame time greatly improved. Some hay-ſeed ſhould be ſprinkled on the bare places, and by this way the next ſummer will yield a crop of hay very different from what has been uſed to be had from that land.

Let the farmer next look over his meadow land, and ſee where it is moſt apt to detain the wet. This is a ſeaſon when the rains will give him an opportunity to know, for water is the beſt and ſureſt level. The importance of taking off an abundant quantity of moiſture from land that is for graſs, is as eſſential as in that of tillage; for in this caſe it always produces a very bad kind of graſs of a ruſhy nature; and often ruſhes alſo. The loweſt part of the ground will be ſeen in this caſe, by the ſtagnation of the greateſt quantity of wet: and we have, in the preceding volumes, told the farmer how he is to diſcharge it.

Where marle is to be uſed upon graſs land, this is the time of laying it on. Let it be ſcattered at diſtances over the ground, and left for the winter froſt, and rains to break and waſh into the ground. It will be of great advantage in the uſe of theſe manures, for the farmer to ſend in a labourer two months after they have been laid on, with orders to break the lumps, which will then be eaſily done with a back blow of the ſpade, and to ſpread the matter more evenly and perfectly over the ground.

Chalk is ſometimes uſeful as a manure on graſs lands. In that caſe the ſoft, tender chalk ſhould always be uſed, and it ſhould be ſpread and broken in the ſame manner.

The fields of artificial graſſes which are planted for the horſehoeing huſbandry, are now to come under the like management alſo. Mr. Tull has ſaid, that no manures are neceſſary for theſe crops, where there is due tillage uſed; and in ſome degree it is right. The crops will be very well ſupported by good tillage of the broad intervals between the rows of them; but the ground is to come into other ſervice afterwards, and it will be beſt prepared for that by a due uſe of ſome of the manures, a little before the time.

Therefore if a lay of ſaintfoine or lucerne planted in this manner be intended to be broke up the next ſeaſon, it will be very proper at this time to ſpread over the ſurface ſome of the manures which require the winter's weather to break and moulder them, and are not liable to be exhauſted by the air.

Chalk and the like are of this kind; and if they be laid on now, and left to the air and weather, a part of their virtue will be gradually waſhed in; and the whole ſubſtance of them will be ſoon after mixed with the ſoil, by the ſucceeding plowings. Thus it will be very well blended with the mould, and exhauſted by no weeds. And in conſequence of the repeated tillage, the land will have the full advantage of manure and fallow.

As we ſuppoſe the artificial graſs to be near the time of breaking up, its roots are ſent deep into the ground, and ſo little of the nouriſhment drawn from the ſuperficial part of the intervals, that very little of the virtue of the dreſſing will be exhauſted that way. The old roots will be ſo far invigorated, as to bring in a very good produce for their laſt crops; and the ſoil will be in a very perfect and excellent condition, when it is broke up for the produce of another growth.

If for any particular reaſon the farmer chuſe to continue the ſame crop on this piece of ground, ſtill this management is uſeful: for the old roots, being paſt their beſt ſervice, ſhould be deſtroyed, and a new plantation raiſed in the intervals, to be ready for ſervice, when the old are taken up.

This has the ſame advantages with a new piece of land; and the parts where the old crop grew, being thus made the middle of the intervals between the new ones, are put into a ſtate of fallow, and recruit again.

This is the advantage of the horſehoeing huſbandry above all other kinds; and by this means land is kept always in a ſtate of ſervice: Mr. Tull ſays, without manure; whether that be the caſe, I will not poſitively ſay; but with a very little manure it certainly is ſo.

As the leaves decay, this will be a time to look to the fences. It is too much neglected; and the proverbial remark is in nothing more true than here, that a little timely care ſaves a great deal of trouble. The gaps in fences, if neglected, ſoon are enlarged; and that which might be ſtopped with little trouble, when firſt made, becomes very miſchievous afterwards. This is the time to look over and ſee all is right; and he who will do this regularly, will ſave himſelf a great deal of future expence.

The ſeaſon is now come alſo for plantations of many kinds. The acorn muſt be planted now, for it does not keep good any time; and the ſeeds of many other trees and ſhrubs ſucceed better at this, than at any other ſeaſon.

In young woods, let the hedges be a part particularly regarded, for cattle are fond of the ſhoots of trees, and the ſeaſon is coming on, when other food being ſcarce, they will be tempted to gnaw them; and the damage is almoſt irreparable.

THE HUSBANDMAN'S KALENDAR.

MONTH THE ELEVENTH.

NOVEMBER.

WHEAT may be yet ſown in ſeveral kinds of land: and frequently the farmer's private affairs do not permit him to ſow ſooner. Let him manage accordingly, and he may ſucceed very well; but careleſsneſs may make it very hurtful. The common choice in wheat ſeed falls upon the lammas kind; but this is not the ſort that is fit for putting into the ground now. Either of the lammas kinds will be in danger of blights and mildews, if ſown ſo late; the proper kind for November is the perky wheat.

If the huſbandman finds he cannot get his ſtubble grounds in order for wheat in October, let him not ſow them without farther care, but continue his labours; and in this month put in that ſeed which is proper for the time. We cannot adviſe the ſowing of a clover lay ſo late as this with wheat; but on the other lands, with due care, there is no danger. The weather muſt alſo, in ſome degree, direct the farmer; for if it be very wet, he ſhould ſow more ſeed in proportion, as ſome will be loſt. The lighter ſoils are fitter for ſowing ſo late as this, than the heavy; and the latter, if it be neceſſary to put in the ſeed at this time, ſhould be dreſſed with ſo much the more care to prepare for it.

The white clay, and the ſoils which approach to the nature of chalk, ſucceed very well at this ſeaſon of ſowing; but they require ſome care of the ſeed afterwards. The very beſt management is to lay on a coat of a very well rotted dung, when the ſeed is in the ground; for this is a ſeaſon at which there is no danger of its being evaporated by the heat. The rains will waſh it in, and it will ſerve, in the mean time, as a ſhelter and defence againſt the cold.

Some of the turnep fields may be conveniently eaten off, and ſown with wheat this month; and this, if there were no other, is a reaſon for the ſowing as late as November.

The larger cattle may be fed as well as the ſmaller, to clear the ground for this purpoſe; and the perky wheat will be the propereſt choice in this, as with other articles.

With regard to the ſteeping and brining of wheat ſeed, the advantage is very certain, and very well known; but this, like moſt other articles of huſbandry, is practiſed too inconſiderately.

Regard ſhould be had to the condition of the ground in the ſoaking of the ſeed. The ingredients will give their virtue, whether the wheat have lain in the liquor a little longer, or a ſomewhat ſhorter time: but the ſeed will be ſuited better or worſe to the ground, by its greater or leſs degree of dampneſs.

The drier the ſeaſon, the leſs ſoaking the wheat ſeed will require; and the wetter the ground is at the time of ſowing, the damper the ſeed may reaſonably be allowed to be. If very wet ſeed be put into ground that is perfectly dry, it will be in danger of decaying in the very act of making it ſhoot. There is, on the other hand, no danger in putting the ſeed dry into the ground when wet; but there is, on the other hand, a very great advantage in being able to impregnate the wheat ſo ſtrongly, as that may be done with the virtue of the ſteeping ingredients, without danger of its decaying.

The farmer is to learn, from this true ſtate of the caſe, that although it be to his advantage to ſteep ſeed thoroughly in wet weather, when the ground is in ſuch a ſtate, as properly to receive the grain in that condition, yet he muſt not do it ſo freely, when the ſoil and ſeaſon are dry. The corn on theſe occaſions muſt lie a leſs time in the brine, and the lime muſt be ſifted over it in large quantity.

Oat ſtubbles may be this month ſown with wheat; provided this has been the original intent of the farmer with his oat crop, and he has taken the care of dunging the ground, before the oats were ſown. This is a practice uſed in many parts of England, and it is a very good one. The oat does not greatly exhauſt ſuch a land; and weeds, which are too often the conſequence of dung, riſe among the oat crops, and are deſtroyed before the ſowing of the wheat. Upon all conſiderations, this is found to anſwer very well, for the oats are ſure to be a very fine crop; and the dung remains in vigour in the land. The plowings that are neceſſary for preparing the ſtubble for wheat, never fail to bring it into a great heart, and the ſucceeding crop is a fine one.

Plow up the land intended for the ſpring ſowing with pulſe. A wheat ſtubble, with proper management, will be extreamly rich for this purpoſe by March.

Clover may alſo be ſown in the ſame month, upon a land which has born wheat the preceding ſeaſon; and oats will ſucceed equally well: for all theſe the ground muſt be very well wrought now; and the ſucceſs then will depend upon the preſent management.

The blue pea, which is cultivated to great advantage in many counties of England, requires alſo the ground, if it ſucceed a wheat crop, to be plowed now; and the hog and maple pea will ſucceed. Farmers know the advantage of change of crops; but they do not attend to it ſufficiently. If they would allow the due care to the leſſer kinds, theſe would often yield them a profit much more proportioned to the greater. The dunging the land intended for oats, which we juſt mentioned, is one ſtrong inſtance; and the giving ſufficient tillage to the land intended for the pulſe kinds in ſpring, is another.

Peaſe will come upon a clover lay with very great advantage; if the proper attention be allowed to them. The clover ſhould be plowed in about the middle of this month, and thrown in broad lands. In this manner it is to lie till March, when it ſhould be harrowed. Then half the peaſe ſhould be ſown under furrow, and the other half harrowed in.

Peaſe will alſo follow barley very well in the ſame manner. The ſtubbles ſhould be plowed now, and laid up till March. The rains, ſnow and froſt of winter, will mellow and improve the ſoil; and the peaſe ſown in March, will have all reaſonable advantage.

The land intended for beans is now alſo to be plowed; and the beſt time for ſowing them upon a wheat ſtubble is in February, or at the utmoſt, in the firſt week in March.

Plow up alſo the wheat ſtubbles, which are intended for barley the ſucceeding ſpring.

Where peaſe have grown this year upon a ſtiff ſoil, the ground ſhould be well wrought now for its firſt preparation; and it will, under the ſucceeding care we ſhall direct, excellently receive turnep ſeed the following May.

Where the crops of wheat that were ſown early are now vigorous above the ground, it is an excellent management to give them encouragement to ſhoot more freely by a top dreſſing of dung. This ſhould be repeated once in ſix weeks during the winter, and the firſt months of ſpring to thoſe crops which want ſo much aſſiſtance. This muſt be done with more care, as the crops are more grown; but it is an excellent method of preſerving nature in a ſtate of vigorous growth. Dung freſh from the ſtable may be uſed in winter for the purpoſe; and there will be no harm from its rankneſs. When the farmer has not had dung enough in ſummer to dreſs his lands for wheat, this is the more neceſſary; and the laying it on now will very well anſwer the purpoſe.

The buſineſs of folding may alſo be ſtill continued to advantage, eſpecially on gravelly grounds, which ſhew the leaſt effect of the earlier dreſſings. The benefit that ariſes from this is evident; but the ſheep often ſuffer for want of care, while they are performing this acceptable ſervice. If they have not dry food in racks, they frequently fall into difdiſorders. The beſt is hay, but good ſtraw will anſwer the purpoſe. Only when ſheep are folded upon wheat lands, it ſhould be wheat ſtraw, not that of barley or oats, for fear of ſome of the corn falling out, and growing up among the wheat. No care in thraſhing will prevent a poſſibility of this; and therefore what grain is left in the ſtraw, ſhould be of a right kind. Hay of vetches will anſwer the purpoſe of this rack-feeding without damage; but this is beſt and richeſt of all, when it has been cut down for that purpoſe, at a time of the vetch being in its greateſt perfection, which is, when it is covered both with flowers and young pods: the ſeeds in theſe being ſoft and tender, loſe the vegetative power in curing the hay; ſo that if any of them ſhould fall out of the pods, as the ſheep move the hay in eating, they would not be in a condition to grow.

This is a material conſideration in the rack-food of folded ſheep. When the farmer is put in mind of it, nothing can be more familiar: but on theſe ſlight obſervations or neglects depends ſo much of his ſucceſs, that he cannot be too careful. In the preſent inſtance, a negligent conduct may loſe his ſheep, or fill his wheat with oats and barley; whereas a moment's thought without a farthing more expence, preſerves the cattle in health, and keeps the crop clear.

When wheat is to be ſowed at this late ſeaſon, and the land itſelf is not very favourable, as in gravelly or poor loamy ſoils, proviſion ſhould be made for the aſſiſtance of the crop. There is a particular manure which anſwers this purpoſe beyond all others, in a November crop of wheat, that is to grow in a brittle or looſe land; this is cows hair. It is to be bought at no great expence; and it ſhould be ſcattered over the ſurface of the ground, before the laſt plowing, in the manner of ſeeds. This when plowed in will act many ways for the improvement of the crop.

In the firſt place, it is a very rich manure, and one that does not diſſolve in the earth, ſo as to part with all its virtue at once: but every ſhower that comes on brings out a freſh portion of its particles, which aſſiſt vegetation.

Then it acts as hair in the making of mortar, keeping the other parts together. A great deal of danger would attend wheat on ſuch a ſoil in winter, from the froſts cracking it, and expoſing the roots of the tender crop; but the hair holds together the particles of looſe earth, and in a very great meaſure prevents that accident. Its virtue laſts till the very time of harveſt, aſſiſting the growth of the plants, and filling the ear. The farmer who conſiders theſe numerous and laſting advantages, will not think the price of this ingredient miſapplied.

If ſheep are not required for folding upon the corn lands, they may now be uſed to the ſame good purpoſe for the improvement of paſturage. The grounds which want them moſt are ſuch as lie cold, though dry, and are for that reaſon ſubject to be over-run with moſs. The dung and urine of the ſheep will do great good in theſe paſtures, at the preſent ſeaſon, becauſe the ſun will not exhauſt their virtue, and the warmth and perſpiration of their bodies aſſiſted by the ſalts of their urine, will deſtroy the moſs, while the general enrichment of the ground, by the waſhing in of dung, will produce graſs in the place of that incumberance; when the ſheep have done their office, by folding on the corn, they may be with due care brought upon the paſture land; and to the careful farmer they will ſerve as an excellent aſſiſtance to both kinds of grounds, and be a profitable article alſo in themſelves.

The care of the ſheep muſt not be omitted in this conſideration. They muſt not be ventured upon the paſture land in wet weather; and it will at all times be of ſervice both to them and to the ground if ſome ſtraw be ſcattered upon the place where they are to lie: the beſt method of all is to fold two nights upon the ſame piece of ground, and feed with dry hay; for dry gravelly paſtures which lie high, and open to the ſun, cow dung is at this ſeaſon an excellent manure. Theſe fields produce but a poor quantity of graſs, becauſe the roots of the turff are too much expoſed to the ſun; and the ground which is naturally barren is defrauded of that manure it might otherwiſe have from the cattle that feed upon it; becauſe they always run for ſhelter about the hedges, and lie under them. There their dung and urine fall; and there the warmth and moiſture of their bodies gives its aſſiſtance.

Cow dung is a proper manure for this kind of ſoil, becauſe it is cool, and the ſoil itſelf hot: it will be better at this time of the year than any other, becauſe the cows muſt have ſome dry meat given them as fodder, and this, in all inſtances, warms the dung of animals. They ſhould be induced to lie in the middle of the field, by giving them their fodder only in that part, and they will keep there the more readily, becauſe the ſun is rather comfortable to them, than diſagreeable at this ſeaſon of the year.

By this means they will drop their dung and urine in the part where it is moſt wanted, and this at a time when the dung is richer than uſual.

We blame the cuſtom of earlier huſbandmen, in planting trees in paſture grounds; but they were right in the practice, and it is only we who have done wrong, by not keeping up to their intentions. They planted theſe trees for the cattle to rub againſt. This and the ſhade of their boughs in ſummer, brought the cattle into that part of the ground; and they had the advantage of their dung where it was moſt wanted; which we have not, becauſe we have left off that cuſtom. They knew, as well as we, that the ſhade of large boughs hurt the graſs underneath them; therefore they trimmed up thoſe trees accordingly, which they placed in paſture ground. They planted but few, and they kept them trimmed up and diſtant. Thus the cattle were tempted to them without damage of the graſs; and the ſeveral parts of the cloſe became of the ſame value.

This is an excellent ſeaſon for laying on other manures upon graſs ground, of whatſoever kind they be; and the great article is the making them fine.

The graſs being eat off by this time, there is no loſs in the covering the grounds with the manure; and it promotes, in the moſt advantageous manner, the growth of the expected ſhoot.

We have named, in the preceding parts of this work, the manures and dreſſings proper for different ſoils; and the farmer may chuſe among them. But in general the mixture of ſeveral ſorts is better than any ſingle kind for graſs ground. The proper ingredients are dung and pond mud, the rotten earth from under hay-ſtacks, and road dirt taken up from the ſtaling places. Theſe being mixed together during ſummer by frequent turning, ſhould now be ſkreened for ſervice. This is no great trouble, and it takes out all accidental rubbiſh that may be among the materials, and even the roots of weeds.

The farmer's buſineſs is to keep his graſs ground clean and level. Every piece of ſtone or brick-bat robs him of ſo much graſs, as would grow upon the ground it covers; and every lump of hard matter, which riſes above the general ſurface of the land, throws itſelf in the way of the mowers ſcythe, and prevents the cutting cloſe. Weeds deſtroy more than rubbiſh, becauſe they ſpread far, and ſhade a great deal of ground; and beſide, what miſchief they do by this, they exhauſt the ground. A little expence for the labour is cheap enough; will prevent all this, and the next crop will repay it twofold.

This is the time of doing it, and let no part be neglected. Let the farmer firſt ſend in his labourers to draw up by the roots ducks mallows and perennial thiſtles. Let theſe be thrown out of the ground; and all accidental rubbiſh, boughs of trees, leaves, or the like, be taken off at the ſame time. If there be mole-hills, or other irregularities of the ſurface, let thoſe alſo be levelled, and then let the manure, ſcreened fine, be brought on, and ſpread regularly over the ground.

There is more trouble in this, we allow, than in the common ſlovenly method; but the advantage is proportioned in an ample manner.

The turnep crops will now come into excellent ſervice for feeding. We have obſerved, that at this ſeaſon the common paſturage is eaten down; and the turneps are the reſource. Let the farmer uſe them properly.

Sheep ſhould now be turned into the turnep fields where there is occaſion; but this ſhould be deferred as long as it can be, and the greater part of the turneps reſerved untouched, while the ſheep have what is neceſſary, and no more.

For this reaſon they ſhould by no means be yet fed at large upon the field. The firſt froſts nip the leaves of the turneps; but vegetation is yet carried on very powerfully; and what cannot go to the leaves is given to the root, which at no ſeaſon encreaſes ſo faſt as during theſe early and ſomewhat ſharp froſts. From this condition of the turneps, the farmer will alſo learn another leſſon, which is to put in his ſheep at times when they will be beſt fed, and do leaſt violence to the crop. Ewes with their lambs feed upon the tops of the turneps, preferring the green part: but weathers are fondeſt of the root. Therefore let the ewes and lambs be turned in earlieſt in the ſeaſon, and the weathers into the ſame field, or the ſame part of a field afterwards.

That the turneps may take all the advantage of growing at a ſeaſon which favours it, let the other fields be kept ſhut up while one is eating; or if the field be large, and the ſheep few, let a partition of hurdles be run acroſs, to divide it off, and the ewes firſt turned into their portion; and theſe being removed into a ſecond diviſion, let the weathers be put into the firſt.

The younger the turneps are, the more advantage they will receive by this reſpite from time to time, from the teeth of the ſheep; and the older they are, the leſs benefit they get by remaining in the ground at this ſeaſon; and indeed, when they are of very long ſtanding, they get harm.

Turneps may be taken up at this time of the year, when there is occaſion; and kept in holes dug in the ground in a dry ſoil, and covered with a ridge of ſtraw, in manner of thatch. But they muſt not be kept in the large quantities together, as potatoes are.

If the farmer have fattening ſheep as well as ſtore ſheep, he ſhould turn the former firſt in, and the roots which they have ſcooped and hollowed, as they lay in the ground, ſhould be picked up for the ſtore-ſheep, which being let into the ſame ground, will greedily feed upon them. In this manner, as alſo in the former management of turning in the ewes firſt, and the weathers afterwards, into the ſame piece of ground, it gets the advantage of a double folding.

If the farmer have large cattle to fatten upon turneps, let him take care in time, by ſowing the right kind. The yellow turnep is the ſort for this ſervice. The cows and oxen will eat it any way, either under cover, or in the ground; and the ſheep will freely come after them, ſo that there will be no loſs. What the oxen leave in the ground, ſhould be picked up for the ſheep; and thus every part will be uſeful.

This remain of the turnep crop, as it muſt be taken out of the ground for the ſheep, may be given them in other places. Thus, if the farmer wiſhes to have the advantage of a fold upon barren land, he may feed with theſe turneps; and the dung and urine of the ſheep will enrich the ground on which they are folded, though the food be brought from elſewhere.

On land intended to be ſown with barley, let the ſheep be brought on late, that the advantage of their dung and urine may be ſtrong in the ground, at the time when it is wanted for the ſeed; and let the ground be plowed but lightly, becauſe the rains will in that caſe waſh the manure to the roots of the new crop; but if it be buried too deep by a careleſs method of plowing, nothing can bring it up again, nor can the crop ever have the advantage of it.

There is another root, the culture of which we have recommended, and which may be of excellent ſervice at this time to the farmer, the carrot. This, though uſually conſidered as a garden product, anſwers as well in the field; and beſide the profit ariſing from the ſale, will anſwer the more immediate purpoſe of the huſbandman, in fattening his cattle: there is no root that anſwers like it. After October the carrot gets no good in the ground, therefore it ſhould be taken up this month, partly that the land may be no longer occupied by a crop, to which it can give no farther aſſiſtance; and partly, becauſe the froſt will make it difficult afterwards to get them out of the ground.

They ſhould be ſorted when they are taken up; the fineſt and beſt looking ſhould be ſent to market, where they will fetch a good price; and the others kept for feeding of oxen and cows that are fattening. There is no food whatſoever that anſwers this purpoſe ſo well; and it may be done by this in a third part of the uſual time.

Horſes will eat them alſo, and they will take the ſame effect. It is a jockey's trick which they chuſe to keep to themſelves, for the ready getting a horſe into good caſe for ſale.

This week ſow and plant the ſeeds of trees. The acorn never ſucceeds ſo well, as when ſown early in November. This fruit, like others which have a great deal of the fleſhy ſubſtance, decays when long kept. It is the reaſon tea-ſeeds never grow when ſent over to England; and the farmer ſhould know as well as the gardener, that theſe kind of ſeeds will not ſtrike, unleſs ſown ſoon after they are fully ripe and hardened.

Sow beech-maſt alſo this month, and cheſnuts; but for theſe laſt trees chuſe the Spaniſh kind. There is ſo much oil in theſe ſeeds, that they keep good ſome time longer than others of that ſize; and if choſen when they come freſh over from thoſe warmer parts of Europe, they ſeldom fail.

Fill up now all deficiencies in hedges, coppices, and timber plantations.

Plow and prepare carefully the lands which are to be ſown with ſpring corn and pulſe. The higher they are thrown up in ridges, and the more they are by that means in all parts expoſed to the air, the better they will ſerve for the ſupply of nouriſhment to the crop. Mr. Tull ſays, this breaking of the mould will anſwer alone for the enriching of it; but it is proper the farmer ſhould add the uſual manures. Though the tillage will not do all, it does a great deal; and the farmer will find it leſſen the price of manure.

Turn out hogs now into the woods, commons, and roads where there are beech trees; and according to the produce of the year, let them remain out a longer or ſhorter time. The beech produces ſome years ſuch abundance of fruit, that at this ſeaſon of the fall of them, hogs will take care of themſelves abroad better than can be done at home, and will be better fattened, and ſweeter than any other way: it is the creatures principal natural food, and we find it agree with them accordingly.

The acorn is a proper mixture with the beech-maſt in this creatures food; and they get one naturally with the other. Farmers ſee this; and where there are no beech trees, they beat the oaks, and get down acorns in abundance, to which they turn in the ſwine. Theſe the greedy creatures eat too ravenouſly, and fall into diſorders. The acorn is too aſtringent for their food alone, but with the beech-maſt it agrees well with them. Where acorns are eaten unripe by the hogs, they do yet more miſchief: this is the cauſe of ſeveral of their diſeaſes, but the farmer is to blame himſelf for it; for there is no way of the hogs getting at unripe acorns, but by his giving them the opportunity. They do not fall from the tree till they are wholeſome, becauſe they hang till thorough ripe, and they then ſlip out of the cup: on the contrary, the farmer beats them down green, and gives cup and all together.

The huſbandman ſhould now attend to the kind of ſheep he buys in: for there are ſmall differences which yet occaſion a great deal of alteration in the profit.

The ſheep without horns, which are fed in ſeveral of our inland counties, are an excellent kind. They fatten eaſily; and there is no kind brings a better price. They require more attendance than others, becauſe they are more vigorous and miſchievous in breaking fences than any; and for the ſame reaſon, they are ſubject to caſt their lambs; miſcarriages ariſing from violent ſtraining. Where they are well attended, nothing of this will happen; and otherwiſe they are extreamly profitable.

Continue reducing the paſture grounds to order, by cutting away all irregularities, and drawing up perennial weeds by the roots.

Where the molehills and anthills are but few and ſmall, a labourer with a ſpade may very well perform the buſineſs; but when they are large, and there are more of them, the plow contrived for this purpoſe is preferable.

THE

HUSBANDMAN'S KALENDAR.

MONTH THE TWELFTH.

DECEMBER.

THE wheat crop is the firſt that the farmer is to conſider in every month; but in this there is little to be done about it.

Sowing is wrong: for if from any accident he has been prevented from putting in his ſeed at a better time as the laſt, or the two preceding months, which are much better, he will do wiſely now to defer it a month longer. He cannot expect much good in ſo hard a ſeaſon; and there is the greateſt danger from ſevere froſts falling upon the young growth. Wheat ſown in January will be very nearly as forward as what ſhould be ſown in December; and there will be leſs danger of its falling by froſts in the firſt period of its growth.

Where the wheat ſown in better time is now up, let the farmer, according to its appearance, and the condition of the land, aſſiſt and improve it by a top dreſſing of dung. This is better than the lighter kinds, as ſoot and pigeons dung, and the like, at the preſent ſeaſon; and they are, in the ſame manner, fitteſt in ſpring. The purpoſe is now to ſtrengthen the ground, and in ſome meaſure to ſhelter the crop: it will then be the point to enliven it for a ſudden ſhoot; dung, which at once warms and covers excellently, anſwers the preſent purpoſe; and thoſe light dreſſings, which are waſhed in as ſoon as laid on, do the other.

The farmer who has his ground ready now, though his prudence prevents his ſowing the wheat till next month, will do it vaſt ſervice by another good plowing. This is a ſeaſon when froſts of the ſevereſt kind may be expected, and ſnow with them; theſe break and mellow the ground, and the more the ſoil which is to feed the enſuing crop is expoſed to them, the more it will receive the advantage. The oftener it is broke and turned up with a new ſurface; the more is the benefit.

Though it be a general rule, that wheat ſhould not be ſown in December, yet does it not exclude all poſſible exceptions. There are lands ſo warm, that froſt takes little effect upon them, in compariſon of what is ſeen in the generality of others. Theſe will ſubject the crop to leſs danger than the others from a December ſowing: therefore it may be more allowable, though we can ſcarce ſay that this practice can be adviſable in any inſtance. If the farmer has ſuch ground where turneps are juſt eaten off, he may with leſs hazard venture in his wheat; but it is better to let alone till the next in any other caſes.

In new ſown wheat fields, during open weather, there is great danger of the crop being devoured by rooks. They find leſs food of other kinds at this than any other ſeaſon; and therefore they will venture hard for the new ſown wheat. Many remedies have been propoſed, but there is none like a gun. The ſhooting a few of theſe cunning creatures diſcourages the reſt; and they will be content with worſe food, where they can eat it with more ſafety.

Where it happens that the ground is in order, and a crop of the pulſe kind wanting, the grey pea, ealled the *horn grey*, may be ſown this month; it is hardy, and will make its way through the unfavourable circumſtances that attend ſuch a plowing.

Plow up the land intended for ſowing with oats: it will anſwer vaſtly better than if omitted to a later time; and the encreaſe of the crop will many times return the advance upon the charge of labour: this we frequently inculcate; and the farmer ſhould carefully attend to it. In other roads of life, profit often riſes principally from the ſavings: but with him, if he know his buſineſs, there is nothing ſo well returned, as a ſmall advance of labour.

The land that has been covered with a turnep crop, and fed down without pecking out the roots, will now lie in an excellent condition. The ſheep eat the turneps as they ſtand, by ſcooping every large root into a kind of baſon. In the mean time, their dung and urine will have greatly enriched the ground; and theſe hollowed roots will detain any wet that falls into them, and will rot with it. Their whole ſubſtance will, in that manner, be transformed into a kind of manure, and by degrees mixed with the ground. Thus will the whole land be very thoroughly enriched; and when it comes to be lightly plowed up together, will receive the ſeed of the ſucceeding crop, with all the needful principles of vegetation.

The froſts are often ſo ſevere at this time, that the ſheep or other cattle cannot get at the turneps intended for their food. Many a farmer has found great miſchief from this in hard winters; but it is his own neglect of doing things in proper time. That is the cauſe. He ſhould expect that ſtrong froſts will harden the ground at this ſeaſon, and prepare accordingly, by taking up a ſufficient quantity of theſe and other roots in time.

We have obſerved, that the turneps will keep when they are out of the ground; and beſide the method by burying them in dry earth, where they will not grow, they may be kept in barns, or elſewhere, under ſhelter, at this ſeaſon, and the froſt will not injure them. This is a very neceſſary precaution; and if it has been omitted by the farmer hitherto, he ſhould now, during the firſt opportunity of open weather, take care to do it. They muſt not be piled up in too large or compact heaps, for fear of heating; nor muſt they lie too open to the air, for their watery juice ſoon freezes, and they may be ſo rendered as uſeleſs, as if they had lain in the ground.

This care being taken of the ground, and of the ſtanding crops, and the ſeverity of the weather probably not admitting any thing more to be done out of doors, let the careful farmer get his hands to work at thraſhing and cleaning his corn, pulſe, and other ſeed for market. They have had time enough now, ſince the bringing them off the ground, to get into perfectly good order; and let him ſee that his labourers do their buſineſs. It is in their power, by a careful management, to advance the price of the corn; or by their ſlovenly way of getting it up, to reduce it: nor will any thing prevent great loſs, as well as diſcredit in this work, but the eye of the maſter.

No crop of corn is ſo clean, that there will not, in a large quantity, be ſome ſeeds of weeds; nor is it uſual to eſcape altogether the common diſorders of ſmut, and the like. If the ſeeds of weeds, or the ſmutted grains of corn be left among the reſt, they will reduce the price; and no care is too much to get them out.

A great requiſite to the cleaning, and indeed to the well thraſhing of corn, is ſufficient barn-room, a good, large, even and hard floor, of due extent in breadth, but chiefly in length, will make the thraſher's work go on more pleaſantly, and it will be performed in every reſpect better. There is more ſcope and freedom for the uſe of the flail in all movements and directions; and when the buſineſs of throwing comes, there are few of the ſeeds which debaſe the corn, that will fly to the end of the caſt, that a ſtrong man can give the wheat. Weight is the requiſite for flying far at this caſt; and the wheat is ſo much heavier than the ſeeds of any ~~of any~~ of theſe weeds, that it will make its way to the end, leaving them at different diſtances along the floor.

After the throwing has been thus well performed, the perfect cleaning of the wheat by the ſieve is very eaſy: this ſeparates ſuch parts as are compoſed of good wheat, with ſome of the huſk, or other foulneſs among it; and theſe naturally get to the top in ſifting; and may eaſily be taken out. They are not to be thrown away like the ſeeds of weeds; and the like light matters which had been ſeparated in throwing; but are to be ſaved; and when there is a quana quantity of them, they are to be thraſhed again, and by that means cleared.

There are many other ways of cleaning wheat, which the farmer may uſe according to the various circumſtances of things; and among theſe the principal is by the fan. This is an excellent and very cleanly method. Weight is the great character of wheat, as we have obſerved before; and no light ſubſtance will be left among it, after the uſe of this inſtrument.

In the thraſhing of barley, for which this month is a very proper ſeaſon, all the neceſſary precautions for wheat ſhould be uſed, and even more; for there is no corn that is ſo difficultly got out of the ear.

A ſound oak floor is a great advantage for this buſineſs; and there muſt be barn-room. Two thraſhers will perform the buſineſs much better than one; and the farmer will be always in the right to allow this, for it is ſo much real gain to him.

When this corn is thraſhed, it ſhould be ſifted before the throwing. The ſieve muſt have large holes, and all that is meant by this article is the ſeparating the beards and pieces of the ſtraw, which have been mixed with it in the thraſhing.

After this it is to be thrown from one end of a long floor to the other; and the ſeeds of weeds, and all other light matters that had been mixed among it, will by that means be ſeparated.

When it is all thrown, let the corn be examined; and if the ſeeds of weeds have not been perfectly ſeparated by this, it muſt be thrown again: this ſecond work will ſeparate what the firſt did not; and the barley will then be ready for the ſkreen, by which it will be finiſhed for the market. It is a good caution to riddle or ſift it again before the ſkreening, for this is apt to be the fouleſt of all grain: the extraordinary labour of all theſe operations is but a ſmall addition of charge to the owner, and he will find a great deal of profit, as well as credit, from the ſeeing it taken, and conſequently carrying his corn clean to market.

The fan which we have mentioned for the cleaning of wheat, and the ſeveral other methods, may all be applied to barley with advantage: but nothing frees it ſo perfectly from all kinds of foulneſs, as the method juſt named.

The cleaning of oats may be done ſolely by the fan; and this, in many places, is all that is expected; no better method being thought of, nor cleaner oats brought to market, than ſuch as are prepared thus. Immediately after thraſhing, the oats are drawn up into a heap, and the long ſtraws and other groſs foulneſſes are got out; they are then brought to the wind, and fanned once, twice, or by ſome very careful perſons three times, and thus finiſhed for the market.

The better method is this: when the oats are thraſhed, draw them into a heap; get out the long ſtraws, and then perform the firſt approach toward cleaning them, by paſſing them through a ſieve with very large holes.

The oats are thus freed from the longeſt ſtraws, and the worſt of their other foulneſs.

After this fan the whole quantity with a knee fan; and then riddle it through a finer ſieve than the firſt. The purer oats go through, and the foul part will get to the top of the parcel in the ſieve: this is to be ſeparated and laid by itſelf; though it is not in the condition of the clean oats, it is not to be treated as refuſe or rubbiſh. If the oats are not thus made ſufficiently clean, they muſt be paſſed again through the ſieve; and by this laſt riddling, they are brought into a clean and creditable condition for the market.

The cleaning of the pulſe kinds is to be performed the ſame way; and the farmer has his choice, according to the occaſion, and the uſe he deſigns to make of them to do it at once by the riddle and fan; or to give them the advantage of throwing.

Peaſe are in a particular manner calculated for cleaning by throwing; becauſe they are ſufficiently heavy to carry themſelves a great way forward, and their round ſhape makes them fly eaſily through the air. The foulneſs that is mixed among them is alſo naturally ſuch, as will moſt eaſily be ſeparated in the throwing, becauſe it is broad and light.

As ſoon as they are thraſhed, let them be drawn up into a heap, and the ſtraw and other large ſtuff that was among them ſeparated; then let them be thrown boldly upon a long floor, after this one ſifting, generally cleans them perfectly. If it does not, they ſhould be ſifted again.

Where the farmer has ſown beans and peaſe together, which, as we have obſerved, is often a good practice, this makes no difficulty in the preſent article of cleaning. The beans and peaſe may be thrown together, and that will ſeparate the chaff, and other refuſe, and afterwards the two kinds may be ſeparated only by a ſieve, with the holes of a proper ſize to let the peaſe through, and ſtop the leaves. Thus each may be put up alone for market. This care being taken of the crops for the ſucceeding year, and the produce of the laſt, let the careful farmer go over his grounds, and cloſe the circle of the year, by ſeeing that every thing remains in that good order wherein he has by our direction, or his own knowledge of his buſineſs, put it.

If his fences want repair, he will now ſee it eaſily, for neither leaves nor weeds will hide the gap: let him take order for the due repairing of them.

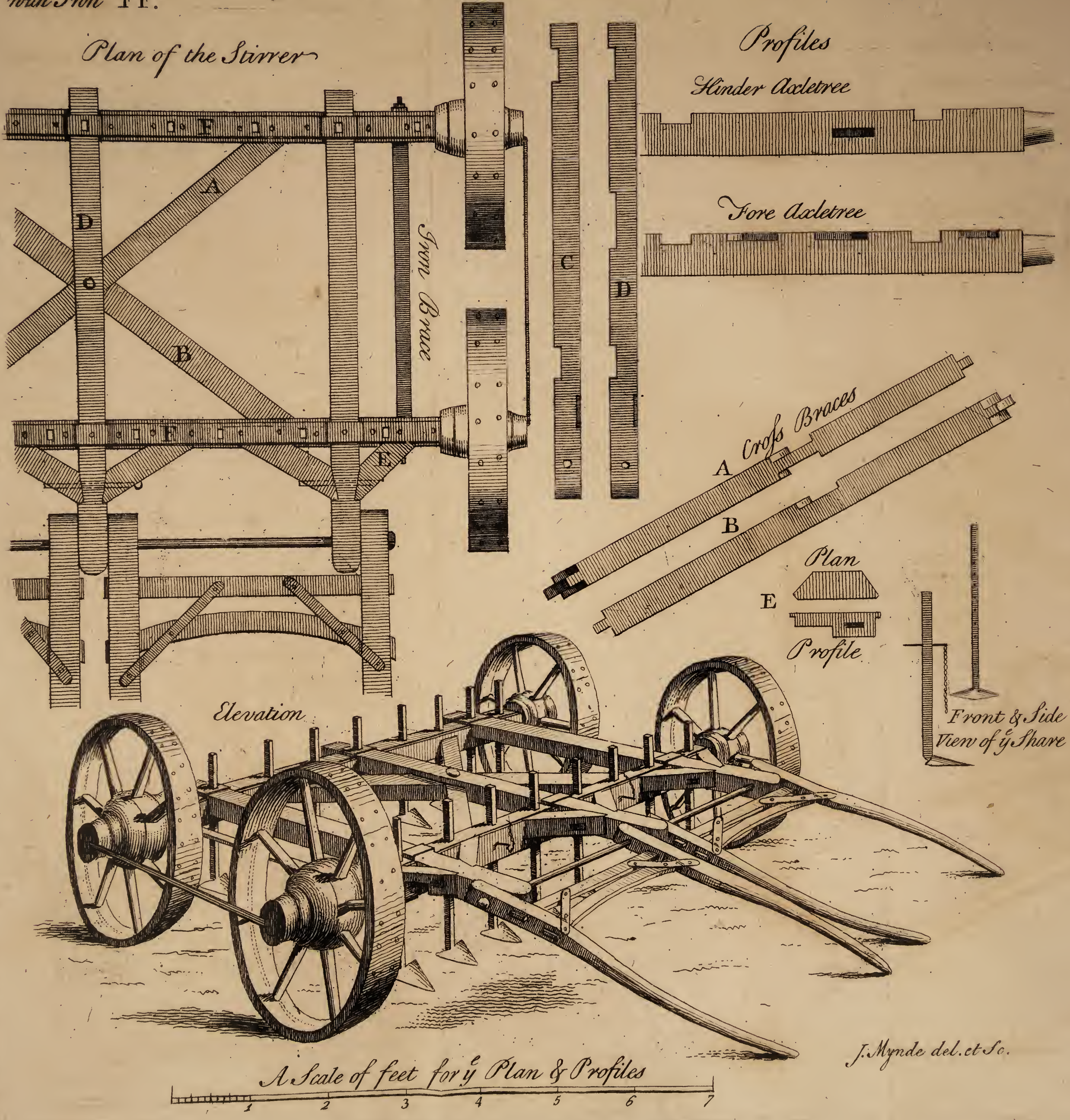
Let him examine his plantations of trees. We have directed, in the preceding volumes, in what manner he is to prepare for their ſecurity, by tying them up to ſtakes. Let him ſee that theſe keep firm; for if they rock with the winds, the trees will rock with them, and an opening will be made at the bottom of the ſtem, which will let in the froſt, and deſtroy the roots.

Let him look to his coppice wood that is new planted, or has been lately felled. The ſucceſsful growth depends upon the young ſhoots ſecurity; and if cattle can get in, they will do vaſt miſchief, by gnawing the tender buds. They love them at all times, but moſt when there is leaſt freſh foods of other kinds.

Every thing being thus put, and kept in order, let him devote the few days at the end of this month, which the church has appointed as a moſt ſolemn feſtival, to the intended ſervice: let him thank God for the ſucceſs of his laſt year; and pray for a bleſſing on the ſucceeding. Let his doors be open to his inferiors, that they may ſay the bleſſings which providence has beſtowed are not thrown away upon him: and let him, by a devout hoſpitality, obtain the good word, and good will of thoſe who are to ſerve him in his next year's buſineſs.

The END of VOL. IV.

The Tops of the Axletree's are Strengthen'd with Iron FF.



J. Mynde del. et Sc.

AN
APPENDIX

A Deſcription of the New Invented Inſtrument for cultivating of Lands, called, THE STIRRER.

THIS Inſtrument contains two Parallel Beams, or Axes, ſupported by four Wheels, wherein two Rows of Shares or Hoes are placed ſo, that the hinder Row cuts the Ground between the Interſtices of the fore Row, conſequently no part of the Ground remains unmoved. Its great Uſe is in ſtirring the Fallows, after they have been twice ploughed in the common Way, and rolled (if neceſſary) and will ſtir twelve Acres, or more, a day. 'Tis alſo uſeful in clearing Weeds out of Wheat and Bean-Stubble, by raiſing up the Shares or Hoes to any Height required, which will greatly forward a Seaſon.

The Proprietors of the Compleat Body of Huſbandry, *eſteem it a Duty equally to the Public and themſelves, to inſert the following, received from the Country.*

Ordered,

THAT the Churchwardens and Overſeers, do forthwith apply to Mr. OSBORNE of *Gray's Inn*, for the

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Publiſhed by the KING's Authority.

To be bound in rough Leather, and claſped; and that the ſame be chained in the Veſtry-Room, for the Public Uſe of the Pariſhioners, to be conſulted by them on all Occaſions, in that Place, and not elſewhere: And that the Name of the Pariſh be ſet on the Book, to prevent its being ſtolen; and to deliver the ſame as ſoon as he can, to Mr. WILLIAM MASTERMAN, of *Lincoln's-Inn*, *London*, who is deſired to pay for it, and ſend it hither if poſſible before *Eaſter*.

By the Veſtry.

Lanteglos, *juxta* Camelford,
Cornwall, March 6. 1757.

S I R,

WE deſire you to execute the above Order, and we wiſh our Example may be followed by every Pariſh in the Kingdom, who are

Your Humble Servants,

John Barnes,
John Seccombe, } Churchwardens.

Jonathan Rundell,
Joſeph Tingcombe, } Overſeers.

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COMPLEAT BODY

OF

HUSBANDRY.

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